

16:300:563

Video Data Methodology

Fall 2021

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Office Hours: Monday and Tuesday, 5:30-7:30, by appointment	Prerequisites or other limitations: none
Mode of Instruction: <input type="checkbox"/> Lecture <input type="checkbox"/> Seminar <input type="checkbox"/> Hybrid <input checked="" type="checkbox"/> X Online CANVAS <input type="checkbox"/> Other	Permission required: <input type="checkbox"/> No <input checked="" type="checkbox"/> X Yes Directions about where to get permission numbers: from Jennifer Manson jennifer.manson@gse.rutgers.edu

Faculty Syllabus Statement for Disability Services:

Rutgers University welcomes students with disabilities into all of the University's educational programs. In order to receive consideration for reasonable accommodations, a student with a disability must contact the appropriate disability services office at the campus where you are officially enrolled, participate in an intake interview, and provide documentation:

<https://ods.rutgers.edu/students/documentation-guidelines>

If the documentation supports your request for reasonable accommodations, your campus's disability services office will provide you with a Letter of Accommodations. Please share this letter with your instructors and discuss the accommodations with them as early in your courses as possible. To begin this process, please complete the registration form (<https://webapps.rutgers.edu/student-ods/forms/registration>).

Learning Goals

This course is designed to prepare you to conduct research in education that makes use of video data. Activities will include discussions of research questions answerable through video data, analyzing video data, exploring the potential and limitations of video data, writing scholarly data analyses, and participating in research.

Course Catalogue Description

The course focuses on critical examination of studies using video data, the design of new mathematics education research that will use video data, and methodological techniques for analyzing video data.

Course Requirements

Successful completion of this course requires students to actively engage in all activities and submit all assignments. This requires that you:

1. Post weekly on CANVAS regarding guiding questions about the readings.
2. Participate fully in all online activities, using both the course website on CANVAS, and the Video Mosaic collaborative (VMC) website.
3. Attain IRB Certification to conduct Human Subjects Research. Human Subjects Certification can be obtained through completion of an on-line course.

Upload a copy of your letter acknowledging completion of the program to CANVAS.

4. Review and provide a detailed discussion of two doctoral dissertations or published research articles in mathematics education, that yielded findings from the analysis of video data.
5. Conduct an individual research project using the VMC repository collection of archived videos and metadata.
6. Write a reflection paper that addresses your activities, discussions, readings, and project work during the course.

Grading

Grades are based on the thoughtful completion of all assignments in a responsible manner. The following distribution of participation will be used as a guide:

1. Weekly participation in the online discussions of readings: 60% of responses to guiding questions of the required readings: 60%
2. Reports of dissertations reviewed: 15%
3. Individual project: 20%
4. Reflection: 5%

Individual Course Project

Project work may include advancing earlier work or joining a new project, facilitated within small group structure, or led by a doctoral student. When joining a group project, the details of project assignments will be communicated to you during an organizational meeting held on ZOOM during the first week of the course (time to be announced). If students are unable to attend this meeting, they should contact the instructor (carolyn.maher@gse.rutgers.edu). Relevant materials and information will be shared at this meeting.

Policy on Academic Integrity

Students are responsible for knowledge of Rutgers University’s academic integrity at policy, found at <http://academicintegrity.rutgers.edu>, and will be held strictly accountable for compliance with it.

Readings and Dissertations

Required and recommended articles, readings, and/or dissertations will be posted on the course website. References are at the end of this document.

COURSE OUTLINE AND ASSIGNMENTS

Topics and readings are subject to modification, based on students’ research interests and the pace of our course. Updated information will be posted on CANVAS.

<p>Week 1 Sept 1-7</p>	<p>Introduction and course overview. Students’ research activities and interests. Summary of Davis Institute research with video data. Introduction to the <i>Video Mosaic Collaborative</i> (VMC). General perspectives on video data.</p> <p>Assignment:</p> <p>(1) Derry et al. (2010). Conducting video research in the learning sciences: Guidance on selection, analysis, technology, and ethics. <i>The Journal of the Learning Sciences</i>, 19, 3-53.</p> <p>(2) View recorded talk: Maher, C. A. (2021, July). The Benefits of Using Videos From Research Studies for <i>Teacher Education: Attending to Students’ Reasoning and Argumentation</i>. <i>Keynote talk for the Topic Study Group (TSG 36) Research on Classroom Practice at the Primary Level at the 14TH International Congress on Mathematical Education (ICME 14), Shanghai, China.</i></p> <p>(3) Post commentary on the above articles to CANVAS, as per class instructions.</p> <p>(4) Get started on IRB certification if it is expired or first time. https://research.rutgers.edu/researcher-support/research-compliance/research-integrity/collaborative-institutional-training</p>
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<p>Week 2 Sept 8-14</p>	<p>Formulating research questions</p> <p>Perspectives on theoretical framework and the formulation of research questions.</p> <p>Assignment:</p> <p>(1) Ch 8: Simon M.A. (2019) Analyzing Qualitative Data in Mathematics Education. In: Leatham K. (eds) Designing, Conducting, and Publishing Quality Research in Mathematics Education. Research in Mathematics Education. Springer, Cham. https://doi.org/10.1007/978-3-030-23505-5_8</p> <p>(2) Ch 12: Leatham K.R. (2019) Principles for Effectively Communicating the Theoretical Framing of Our Work. In: Leatham K. (eds) Designing, Conducting, and Publishing Quality Research in Mathematics Education. Research in Mathematics Education. Springer, Cham. https://doi.org/10.1007/978-3-030-23505-5_12</p> <p>(3) Post commentary on the above article to CANVAS</p> <p>(4) IRB certification letter to be uploaded before next week.</p>
<p>Week 3 Sept 15-21</p>	<p>How is video being used for current research on teacher education to enhance learning of how children reason mathematically?</p> <p>Assignment: Reading and online discussion per guiding questions.</p> <p>(1) Maher, C. A. (2008). Video recordings as pedagogical tools in mathematics teacher education. In D. Tirosh and T. Wood (Eds.), <i>International Handbook of Mathematics Teacher Education: Vol. 2: Tools and Processes in Mathematics Teacher Education</i> (pp. 65-83). Rotterdam, The Netherlands: Sense Publishers.</p> <p>(2) Van Ness, C. and Maher, C. A. (2019). Analysis of the argumentation of nine-year olds engaged in discourse about comparing fraction models. <i>Journal of Mathematical Behavior</i>, (53), 1, 3-41. Elsevier, London. https://doi.org/10.1016/j.jmathb.2021.100874</p> <p>(3) Post commentary on the above articles to CANVAS, as per class instructions.</p>
<p>Week 4 Sept 22-28</p>	<p>How is video being used for current research on pre-service teacher education to enhance learning of children's mathematical reasoning?</p> <p>Assignment: Reading and online discussion per guiding questions.</p> <p>(1) Palus, M. F. & Maher, C. A. (2013). Teachers learning about student reasoning through video study. <i>Mediterranean Journal of Research in Mathematics Education</i>, 12(1-2), 39-55.</p>

	<p>(2) Post commentary on the above article to CANVAS, as per class instructions.</p> <p>(3) Arrange Zoom meeting with instructor re course project.</p>
<p>Week 5 Sept 29 – Oct 5</p>	<p>The analysis of video data. Transcriptions, rubrics, coding schemes, and interpretations of findings.</p> <p>Assignment:</p> <p>(1) Powell, A. B., Francisco, J. M., & Maher, C. A. (2003). An analytical model for studying the development of Learners' mathematical ideas and reasoning using videotape data. <i>The Journal of Mathematical Behavior</i>, 22(4), 405-435</p> <p>(2) Post commentary on the above article to CANVAS, as per class instructions.</p> <p>(2) Doctoral dissertation readings, to be specified.</p> <p>(3) Arrange Zoom meeting with instructor re course project.</p>
<p>Week 6 Oct 6-12</p>	<p>Exploring the use of Analytic Tool for VMC Repository.</p> <p>Assignment:</p> <p>(1) Zoom meeting (To be scheduled). Guest instructor: Dr. Victoria Krupnik, Research Consultant, Rutgers University.</p> <p>(2) See tutorial of the Analytic Tool online.</p> <p>(3) Agnew, G., Mills, C. M., & Maher, C. A. (2010). VMCAnalytic: Developing a collaborative video analysis tool for education faculty and practicing educators. In R. H. Sprague, Jr. (Ed.), <i>Proceedings of the 43rd Annual Hawaii International Conference on System Sciences (HICCS-43): Abstracts and CD-ROM of Full Papers</i>. IEEE Computer Society, Conference Publishing Services: Los Alamitos, CA.</p> <p>(4) Post commentary on the above article to CANVAS, as per class instructions.</p>
<p>Week 7 Oct 13-19</p>	<p>Exploring video research in the learning sciences.</p> <p>Assignment:</p> <p>(1) Goldman, R. (2007). Video representations and the perspective framework: Epistemology, ethnography, evaluation, and ethics. In Goldman, R., Pea, R., Barron, B. and Derry, S. (Eds.), <i>Video Research in the Learning Sciences</i>, 3-38, Lawrence Erlbaum Associates: Mahwah.</p> <p>(2) Post commentary on the above article to CANVAS, as per class instructions.</p>

<p>Week 8 Oct 20-26</p>	<p>What are some of the problems and issues regarding methodologies for video data analysis?</p> <p>Assignment:</p> <p>(1) Derry et al. (2010). Conducting video research in the learning sciences: Guidance on selection, analysis, technology, and ethics. <i>The Journal of the Learning Sciences</i>, 19, 3-53.</p> <p>(2) Post commentary on the above articles to CANVAS, as per class instructions.</p>
<p>Week 9 Oct 27 – Nov 2</p>	<p>(1) Discuss advantages/limitations of collecting and analyzing video data;</p> <p>(2) Discuss issues of data collection and inter-rater discrepancies in scoring.</p> <p>Assignment:</p> <p>(1) Ch 10: Davis B. (2019) Going to Where Your Research Takes You. In: Leatham K. (eds) Designing, Conducting, and Publishing Quality Research in Mathematics Education. Research in Mathematics Education. Springer, Cham. https://doi.org/10.1007/978-3-030-23505-5_10</p> <p>(2) Ch 11: Kastberg S.E. (2019) Navigating the Self and Engaging with Others in Constructing Visions of Quality in Mathematics Education Research. In: Leatham K. (eds) Designing, Conducting, and Publishing Quality Research in Mathematics Education. Research in Mathematics Education. Springer, Cham. https://doi.org/10.1007/978-3-030-23505-5_11</p> <p>(3) Post commentary on the above article to CANVAS, as per class instructions.</p>
<p>Week 10 Nov 3-9</p>	<p>Assignment:</p> <p>(1) Ch 2: Gravemeijer K., Prediger S. (2019) Topic-Specific Design Research: An Introduction. In: Kaiser G., Presmeg N. (eds) Compendium for Early Career Researchers in Mathematics Education. ICME-13 Monographs. Springer, Cham. https://doi.org/10.1007/978-3-030-15636-7_2</p> <p>(2) Ch 9: Chan M.C.E., Mesiti C., Clarke D. (2019) Problematising Video as Data in Three Video-based Research Projects in Mathematics Education. In: Kaiser G., Presmeg N. (eds) Compendium for Early Career Researchers in Mathematics Education. ICME-13 Monographs. Springer, Cham. https://doi.org/10.1007/978-3-030-15636-7_9</p>

	(3) Post commentary on the above article to CANVAS, as per class instructions.
Week 11 Nov 10-16	Assignment: (1) Ch 3: Moschkovich J.N. (2019) A Naturalistic Paradigm: An Introduction to Using Ethnographic Methods for Research in Mathematics Education. In: Kaiser G., Presmeg N. (eds) Compendium for Early Career Researchers in Mathematics Education. ICME-13 Monographs. Springer, Cham. https://doi.org/10.1007/978-3-030-15636-7_3 (2) Post commentary on the above article to CANVAS, as per class instructions.
Week 12 Nov 17-23	(1) Maher, C. A., Landis, J. H. & Palius, M. F. (2010). Teachers attending to students' reasoning: Using videos as tools. <i>Journal of Mathematics Education</i> 3(2), 1-24. (2) Post commentary on the above article to CANVAS, as per class instructions. (3) Continue work on individual/group work on research projects and reviews of doctoral dissertations.
Nov 25-29	NO CLASS MEETING – THANKSGIVING BREAK
Week 13 Nov 30 – Dec 7	(1) First dissertation review posted, using rubric provided. (2) Begin reflection paper.
Week 14 Dec 8 – Dec 14	(1) Second dissertation review posted, using rubric provided. (2) Continue reflection paper.
Week 15 Dec 17	All Assessments, Reflections, Final Reports for Individual Research and Dissertation Studies Reports due via submission in Canvas on course website no later than Dec 17.

DOCTORAL DISSERTATIONS USING VIDEO DATA (*supervised by C. A. Maher*)

Aboelnaga, Eman, EdD (2011). *A case study: The development of Stephanie's algebraic reasoning*. Unpublished doctoral dissertation, Rutgers, The State University of New Jersey, New Brunswick.

Ahluwalia, Anoop, PhD (2011). *Tracing the building of Robert's connections in mathematical problem solving: A sixteen-year case study*. Unpublished doctoral dissertation, Rutgers, The State University of New Jersey, New Brunswick.

Baldev, P. (2009), EdD. *A study of urban, seventh-grade students' ideas about linear functions*. Unpublished doctoral dissertation, Rutgers, The State University of New Jersey, New Brunswick.

Benko, Palma, EdD (2006). *Study of the Development of Students' Ideas in Probability*. Unpublished doctoral dissertation, Rutgers, The State University of New Jersey, New Brunswick.

Brookes, Elijah, EdD (2015). *Student Roles in Collaborative Math Groups*. Unpublished doctoral dissertation, Rutgers, The State University of New Jersey, New Brunswick.

Bulgar, Sylvia, EdD (2002). *Through a Teacher's Lens: Children's Constructions of Division of Fractions*. Unpublished doctoral dissertation, Rutgers, The State University of New Jersey, New Brunswick.

Cipriani, Phyllis, PhD (2017). *The Effect of a Professional Development Intervention on In-service Teachers' Attending to Mathematical Reasoning*. Unpublished doctoral dissertation, Rutgers, The State University of New Jersey, New Brunswick.

Giordano, Patricia, EdD (2008). *Learning the concept of function: Guess my rule activities with Robert B. Davis*. Unpublished doctoral dissertation, Rutgers, The State University of New Jersey, New Brunswick.

Francisco, J. M. PhD (2004). *Students' reflection on mathematical learning: Results from a longitudinal study*. Unpublished doctoral dissertation, Rutgers, The State University of New Jersey, New Brunswick.

Gerstein, Miriam, PhD (2017), *The Interplay Between Teacher Questioning and Student Reasoning*. Unpublished doctoral dissertation, Rutgers, The State University of New Jersey, New Brunswick.

Glass, B. H., EdD (2001). *Mathematical problem solving and justification with community college students*. Unpublished doctoral dissertation, Rutgers, The State University of New Jersey, New Brunswick.

Halien, William B., EdD (2011). *Tracing students' understanding of instantaneous changes*. Unpublished doctoral dissertation, Rutgers, The State University of New Jersey, New Brunswick.

- Horwitz, Kenneth, EdD (2016). *Utilizing Video Analytics to Examine the Role of Representations in Problem Solving Across Grade Bands*. Unpublished doctoral dissertation, Rutgers, The State University of New Jersey, New Brunswick.
- Kiczek, R. D., EdD (2000). *Tracing the development of probabilistic thinking: Profiles from a longitudinal study*. Unpublished doctoral dissertation, Rutgers, The State University of New Jersey, New Brunswick.
- Krupnik, Victoria, PhD (2020). *Early Development and Application of Proof-Like Reasoning: Longitudinal Case Studies*. Unpublished doctoral dissertation, Rutgers, The State University of New Jersey, New Brunswick.
- Leslie, Joyce, EdD (2020). *Investigating a Teacher Professional Development Model of Algebra Learning for Low SES Minority Students*. Unpublished doctoral dissertation, Rutgers, The State University of New Jersey, New Brunswick.
- Marchese, C., EdD (2009). *Representation and Generalization in Algebra Learning of 8th grade students*. Unpublished doctoral dissertation, Rutgers, The State University of New Jersey, New Brunswick.
- Martino, Amy M., EdD (1992). *Elementary Students' Construction Of Mathematical Knowledge: Analysis by Profile*. Unpublished doctoral dissertation, Rutgers, The State University of New Jersey, New Brunswick.
- Mayansky, Elmira, EdD (2007). *An Analysis of the Pedagogy of Robert B. Davis: Young Children Working on the Tower of Hanoi Problem* Unpublished doctoral dissertation, Rutgers, The State University of New Jersey, New Brunswick.
- McGowan, William, EdD (2016). *Exploring In-Service Teachers' Recognition of Student Reasoning in a Semester-Long Graduate Course*. Unpublished doctoral dissertation, Rutgers, The State University of New Jersey, New Brunswick.
- Mueller, Mary, EdD (2007). *A study of the development of reasoning in sixth grade students*. Unpublished doctoral dissertation, Rutgers, The State University of New Jersey, New Brunswick.
- Muter, Ethel M., EdD (1999) *The Development of Student Ideas in Combinatorics and Proof: A Six Year Study*. Unpublished doctoral dissertation, Rutgers, The State University of New Jersey, New Brunswick.
- Palius, Marjory F., EdD (2013). *Deepening Teachers' Awareness of Students' Mathematical Reasoning through Video Study in an Online Course*. . Unpublished doctoral dissertation, Rutgers, The State University of New Jersey, New Brunswick.
- Pantozzi, R., EdD (2009). *Students Making Sense of the Fundamental Theorem of Calculus*. Unpublished doctoral dissertation, Rutgers, The State University of New Jersey, New Brunswick.
- Powell, A. B., PhD (2003). *"So let's prove it!" Emergent and elaborated mathematical ideas and reasoning in the discourse and inscriptions of learners engaged in a combinatorial task*. Unpublished doctoral dissertation, Rutgers, The State University of New Jersey, New Brunswick.

- Schmeelk, Suzanna, EdD (2010). *An Investigation of Fourth-Grade Student's Growing Understanding of Rational Numbers*. Unpublished doctoral dissertation, Rutgers, The State University of New Jersey, New Brunswick.
- Shay, K., EdD (2009). *Tracing middle school students' understanding of probability*. Unpublished doctoral dissertation, Rutgers, The State University of New Jersey, New Brunswick.
- Spang, K., EdD (2009). *Teaching Algebra Ideas to Elementary School Children: Robert B. Davis' Introduction to Early Algebra*. Unpublished doctoral dissertation, Rutgers, The State University of New Jersey, New Brunswick.
- Sran, Manjit K., EdD (2010). *Tracing Milin's Development of Inductive Reasoning: A Case Study*. Unpublished doctoral dissertation, Rutgers, The State University of New Jersey, New Brunswick.
- Steencken, E. P., EdD (2001). *Tracing the growth of understanding of fraction ideas: A fourth grade study*. Unpublished doctoral dissertation, Rutgers, The State University of New Jersey, New Brunswick.
- Steffero, Maria, EdD (2010). *Tracing beliefs and behaviors of a participant in a longitudinal study for the development of mathematical ideas and reasoning: A case study*. Unpublished doctoral dissertation, Rutgers, The State University of New Jersey, New Brunswick.
- Sweetman, Timothy, EdD (2005). *The Flow of Mathematical Ideas in Group Problem-Solving Sessions*. Unpublished doctoral dissertation, Rutgers, The State University of New Jersey, New Brunswick.
- Teehan, Kara, PhD (2019). *Applying the Pirie-Kieren Theory for Tracing Growth in Mathematical Understanding*. Unpublished doctoral dissertation, Rutgers, The State University of New Jersey, New Brunswick.
- Tarlow, Lynn D., EdD (2004). *Tracing Students' Development of Ideas in Combinatorics and Proof*.
- Tozzi, Barbara, EdD (2011). *A Study on Middle School Students' Use of Computer Generated Representations As They Solve a Probability*. Unpublished doctoral dissertation, Rutgers, The State University of New Jersey, New Brunswick.
- Uptegrove, E. B., EdD (2005). *To symbols from meaning: Students' long-term investigations in counting*. Unpublished doctoral dissertation, Rutgers, The State University of New Jersey, New Brunswick.
- Van Ness, Cheryl, PhD (2017). *Creating and Using VMCAalytics for Preservice Teachers' Studying of Argumentation*. Unpublished doctoral dissertation, Rutgers, The State University of New Jersey, New Brunswick.
- Walter, J. G., EdD (2004). *Tracing mathematical inquiry: High school students mathematizing a shell*. Unpublished doctoral dissertation, Rutgers, The State University of New Jersey, New Brunswick.
- Warner, L. B., EdD (2004). *Behaviors that indicate mathematical flexible thought*. Unpublished doctoral dissertation, Rutgers, The State University of New Jersey, New Brunswick.

Yankelewitz, D., EdD (2009). *The development of mathematical reasoning in elementary school students' exploration of fraction ideas*. Unpublished doctoral dissertation, Rutgers, The State University of New Jersey, New Brunswick.

References:

Agnew, G., Mills, C. M., & Maher, C. A. (2010). VMCAnalytic: Developing a collaborative video analysis tool for education faculty and practicing educators. In R. H. Sprague, Jr. (Ed.), *Proceedings of the 43rd Annual Hawaii International Conference on System Sciences (HICCS-43): Abstracts and CD-ROM of Full Papers*. IEEE Computer Society, Conference Publishing Services: Los Alamitos, CA.

Derry et al. (2010). Conducting video research in the learning sciences: Guidance on selection, analysis, technology, and ethics. *The Journal of the Learning Sciences*, 19, 3-53.

Goldman, R. (2007). Video representations and the perspective framework: Epistemology, ethnography, evaluation, and ethics. In Goldman, R., Pea, R., Barron, B. and Derry, S. (Eds.), *Video Research in the Learning Sciences*, 3-38, Lawrence Erlbaum Associates: Mahwah.

Goldman, S. & McDermott, R. (2007). Staying the course with video analysis. In Goldman, R., Pea, R., Barron, B. and Derry, S. (Eds.), *Video Research in the Learning Sciences*, 101-114. Lawrence Erlbaum Associates: Mahwah.

Goldman, R., Pea, R., Barron, B., & Derry, S. (Eds.). (2007). *Video research in the learning sciences*. Mahwah, NJ: Erlbaum.

Maher, C. A. (2008). Video recordings as pedagogical tools in mathematics teacher education. In D. Tirosh and T. Wood (Eds.), *International Handbook of Mathematics Teacher Education: Vol. 2: Tools and Processes in Mathematics Teacher Education* (pp. 65-83). Rotterdam, The Netherlands: Sense Publishers.

Maher, C. A. (2021, July). The Benefits of Using Videos From Research Studies for Teacher Education: Attending to Students' Reasoning and Argumentation. *Keynote talk for the Topic Study Group (TSG 36) Research on Classroom Practice at the Primary Level at the 14TH International Congress on Mathematical Education (ICME 14), Shanghai, China*

Maher, C. A., Landis, J. H. & Palus, M. F. (2010). Teachers attending to students' reasoning: Using videos as tools. *Journal of Mathematics Education* 3(2), 1-24.

Palus, M. F. & Maher, C. A. (2013). Teachers learning about student reasoning through video study. *Mediterranean Journal of Research in Mathematics Education*, 12(1-2), 39-55.

Powell, A. B., Francisco, J. M., & Maher, C. A. (2003). An analytical model for studying the development of Learners' mathematical ideas and reasoning using videotape data. *The Journal of Mathematical Behavior*, 22(4), 405-435.

Tirosh, D. and Wood, T. (Eds.), *International Handbook of Mathematics Teacher Education: Vol. 2: Tools and Processes in Mathematics Teacher Education* (pp. 65-83). Rotterdam, The Netherlands: Sense Publishers.

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