

**Session Title:**

Digital Suite for Supporting Research and Online Data Collection, Analysis, and Management

**MSP Project Name:**

Mathematics Teacher Leadership Center (Math TLC)

**Presenters:**

Reshmi Nair, University of Northern Colorado  
Shandy Hauk, WestEd  
Jodie Novak, University of Northern Colorado

**Authors:**

Reshmi Nair, University of Northern Colorado (Lead)  
Shandy Hauk, WestEd (Lead)  
Jodie Novak, University of Northern Colorado (Lead)  
Heng-Yu Ku, University of Northern Colorado  
David Glassmeyer, University of Northern Colorado

**Project Session****Strand 3****Summary:**

Just as demand for online teaching and learning is increasing, there is a growing need for technology-rich methods of communication for research data gathering, analysis, and dissemination. The Math TLC project offers in-service mathematics teachers distance delivered master's degree and Teacher Leadership programs that rely on both synchronous and asynchronous innovations. Also, the research team for the project is distributed across the U.S., and hence is required to communicate mostly in the online environment. In this session we share ways in which the research team has adopted and adapted online tools for collaborative research and data management.

**Section 1: Questions framing the session:**

Given the distributed nature of the teaching and learning model in the Mathematics Teacher Leadership Center (Math TLC) and the far-flung locales of research team members (distributed across seven states) what methods of communication for research data gathering, collaborative analysis, and dissemination are authentic and productive for the project?

**Section 2: Conceptual framework:**

The Math TLC is a MSP serving mathematics teachers in the Rocky Mountain region and is hosted as a partnership between two institutions: University of Northern Colorado and University of Wyoming. It offers opportunities for current math teachers, including teachers from rural areas, to participate in one of two professional development experiences: (1) a distance delivered master's degree program in mathematics for

secondary teachers, (2) a mathematics Teacher Leadership program for teachers and district personnel in grades 4-12. The programs engage participants from various parts of Colorado and Wyoming (and, recently, from other states). Taught by faculty at the two partner universities, courses are offered online during the fall and spring semesters, and as blended face-to-face and distance-delivered courses during the summer terms.

During the initial year, the Math TLC focused on researching the knowledge base on teaching and learning about using video and online delivery technologies and chose a common platform on which to deliver the programs: the courses have been offered using a combination of asynchronous course management tools like Blackboard and Edmodo and synchronous video and the online conferencing tool Elluminate (now Blackboard *Collaborate*). Math TLC classes, seminars, staff meetings, and mini-conferences all rely on this web-based, moderated video and audio communication system and its several threads for communication (e.g., chat, whiteboard, web browsing, file-sharing).

< <http://www.blackboard.com/Platforms/Collaborate/overview.aspx> >

The Math TLC project is rooted in attention to the interaction among intercultural competence, mathematical thinking, and teacher development. The *Feedback Loop* for the research in the project has *adapted, grown, perturbed, and caused and responded to challenges* about how to operationalize this vision. In response to the realities on the ground in the implementation of the distance-delivered Math TLC master's degree (in teaching secondary mathematics) and Teacher Leadership Program (for those moving into professional roles that involve various leadership and management skills), the research design and its implementation has evolved in the use of technology itself. The project research team is made up of more than a dozen people: project faculty (4 to 6 members), post-docs (1 to 2 members), graduate students (4 to 8 members), and affiliated faculty (3 to 5 members) who are distributed across seven U.S. states. Since its inception, the group has worked to build a distributed research collaboration model. The particular perspective on adaptive implementation has been driven by the team's dedication to authentic research that is worthwhile and valuable to project teacher-participants, teacher-educators, and researchers as well as a variety of stakeholders (e.g., the funder, the state, the general public).

### **Section 3: Explanatory framework:**

In working with participants in distance-delivered master's and Teacher Leadership programs, the research team learned that it was not only possible but necessary to gather data using technology. Three times each year the Tech Team (a working group within the research team) surveys participants in Math TLC programs about their experiences learning in the project's technology-rich and technology-driven activities/courses. The survey results have indicated that the teacher participants had evolved adeptness in technology. This led the research team to administer digitally (through the web) what had been a paper-based assessment of pedagogical content knowledge as well as conduct interviews with online video-based technology.

Additionally, we note that on admission, Math TLC members sign forms acknowledging that the main rooms in the online classes they attend will be archived (audio, video, text).

Members of the research working group examining the master's program have been able to gather field notes by real-time visits to virtual classes on Elluminate (now Collaborate) as well as through viewing of the archives. What is more, from the examination of the distance and blended delivery of courses, the research team has also harvested ideas for their own distance-distributed work. The research team as a whole and each of its working groups uses a shared Collaborate space for discussions, communication, and synchronous interaction; also, members use skype for small group meetings and quick conversations on a regular basis. In addition to the synchronous conferencing, the team has improved its synchronous and asynchronous data management systems. For sanitized data analysis and manuscript development, the team has been using dropbox and googledocs. For managing sensitive data like audio files and participant information, the team has been using Beardrive, which is based on a reliable and strenuously tested file sharing and storage software called Digital Locker developed specifically for educational institutions by Xythos. These tools provide access to the data anytime and anywhere. Hence, the team is able to share documents before, within, and after the meetings.

#### **Section 4: Discussion:**

Teaching, learning and collaborating via online technology have become common in primary, secondary, and post-secondary teacher professional development. Thus, there is a requirement not only to understand the experiences of people who are teaching and learning virtually, but also how such experiences can be extended to other collaborative efforts. The Math TLC research team is working on both of these fronts. Firstly, as a research endeavor, it examines the experiences of project participants. Secondly, as a group of people working together, the research team has noted its own efforts to take up the innovations in the project and adapt them for collaborative research use.

Technology resources in online environments have advanced beyond discussion boards and other text-based tools to include audio and video communication, electronic whiteboards, interactive web-based communication tools, instant access to Java-based interactive applets, blogs and wikis, and even shared access through software like dropbox and googledocs. One of the achievements of our research team this year was the administration of an assessment online, one that was done face-to-face in the past. The experiences of the research team members in communicating in online environments, in observing the online activities of participants, and in understanding the constraints of technology, allowed the test developers to modify the test to make it suitable to be conducted online. The results of this year's online administration of the test among continuing participants (those who had at least 4 weeks of experience in taking at least one project course online) show no significant differences in the quality and depth of responses to the items in this new setting.

During this session we will share the ways in which the findings enabled the Math TLC research team to grow and include more collaborators across more states using technology. These will be beneficial for other MSP projects that have teams distributed over large regions.

**Section 5: How will you structure this session? What is your plan for participant interaction?**

The presentation will engage the audience in an opening activity: Assume that a group of 10 people have a task to complete and must communicate; also assume they are located at 4 different sites; each person has a computer. Participants' task will be to brainstorm ways to get the group of 10 people to share their ideas and communicate/converse simultaneously *without talking over each other*, using whatever tools come to mind for those in the room. We will then illustrate with video clips five ways of communication used by our team and offer information about the affordances and constraints of each approach. Our aim is to show how we have been able to create a digital suite to support complex interactions in the Math TLC research work. We hope that other MSPs will be able to take some of these ideas into their own collaborations in creating online working environments and better data management.