Report to the National Science Foundation

New Technologies for the Study of Teaching

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Magdalene Lampert
University of Michigan

Jan Hawkins
EDC's Center for Children and Technology

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With assistance from:
Teresa McMahon, Merrie Blunk, Mark Hoover, Deidre LeFevre, Jennifer Lewis, Alice Merz, Jim Merz, Goeff Phelps, Ed Wall, and Raven Wallace
University of Michigan

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1. Introduction

The intention of this workshop was to explore the best ways to design and use video and multimedia technologies to enhance the study of teaching and the development of skilled teachers in K-12 mathematics, science, and technology. The workshop was structured to provide opportunities for key people who work in the fields of research and development in technology, teaching, and learning to engage with teacher educators and teachers in conversation about new technologies for the study of teaching. Participants included designers, consumers, and researchers of multimedia materials for the study of teaching as well as four groups of practitioners representing different uses of video: 1) members of a teacher study group who use video to study teaching together; 2) teachers who have developed video records of their practice as part of the portfolio for National Board certification to represent their practice to others; 3) teacher educators who video themselves teaching in K-12 classrooms for use in their research and teaching in higher education; and 4) teachers who use video records of their own practice to look more closely at their own students and how their students think.

The need for the workshop arose from the intersection of developments in multimedia technologies and developments in what we know about teacher learning. Technologies are changing rapidly and becoming easier to use. Teachers need to learn more about their learners, about new curricula, assessment and evaluation processes, and new instructional strategies, and researchers are beginning to appreciate how difficult it is to learn these things. This is, therefore, an opportune time for a diverse set of participants to examine the intersection among some very basic questions:

- What knowledge is necessary for teaching?
- How might the study of teaching be productively undertaken, both by practitioners and by researchers?
- How might study of and knowledge about teaching be enriched with multimedia learning tools?

Our identification of these issues and proposal for a meeting to discuss them resulted from considerable deliberation. After carefully choosing a group of invitees that would be small enough to have productive conversations about the issues, yet large enough to represent diverse perspectives and projects, we received numerous requests from others highly regarded in their respective and relevant fields to attend the workshop. The high degree of

interest to attend, to learn about the outcomes of the meeting, and to continue conversations/work beyond the meeting venue has been further indication of the need for such a gathering and for further work on these problems. (A list of participants can be found in Appendix A.)

The meeting was designed to go deeper into fundamental problems of design and use than the simple demonstration and discussion of existing projects would support. We provided participants with computer-based tools and multimedia records of teaching and learning and set them to work in heterogeneous groups (each composed of the different specialties represented) on design tasks planned to surface their assumptions about how teachers learn and what technology has to offer. We also organized activities that gave teachers the opportunity to talk about their experiences of being videotaped, watching themselves and other teachers on video, and the use of multimedia materials to study teaching. We looked at existing materials as works-in-progress and discussed how they might be modified to better serve a variety of purposes. As participants designed hypothetical learning experiences for teachers and looked at materials currently in use, we asked everyone to consider the following questions, putting themselves and others in the role of designer:

- Who is the audience for this activity?
- What multimedia and accompanying materials does this activity use and why were they selected?
- What exactly are users meant to do with the multimedia materials?
- Why do the designers of these materials want users to do what they have planned? — i.e. what are their purposes, why are these purposes important to these designers, why do they think this is a good idea for some particular set of users?
- What do the designers hope will happen when users work on what they have planned?
- What are the designers' concerns about what problems might arise from the use of multimedia materials in this activity, and what plans have they made to facilitate things if those problems were to arise?

- What are your concerns are about what problems might arise from the use of multimedia materials in this activity, and what plans might you make to facilitate things if those problems were to arise?

- How will the designers help users to figure out whether they have accomplished what the materials were designed to accomplish?

Interspersed with designing and analyzing materials and their uses, we brought participants together in both large and small group discussions of the multiple perspectives that were expressed as they considered these questions. (The full agenda of the meeting can be found in Appendix B.)

In what follows, we describe the themes that emerged from those discussions in two regards. First with regards to the state of the "art" as best we can determine given the broad range of participants in the meeting. Second, with a focus on "what next?" both as participants defined important next steps and as they emerged from our analysis of the meeting.

2. Current State of the "Field"

A. Teacher education and professional development can be and has been affected by changes in technology.

- The belief is widely shared across professional boundaries that video and multimedia environments containing video are valuable materials for the education of teachers. Moreover, they are likely to have important roles to play in improving teacher education in the future because they can represent practice in ways that are not possible in other media. For example, video and multimedia may be especially suited to helping teachers better "learn to see" the complex practices of teaching and to acquire the flexible habits of mind needed to adapt their knowledge to ever changing classroom situations and challenges.

- Video and multimedia featuring video are being used for a number of purposes in teacher education and professional development. There are notable examples of classroom-based video being used with powerful effect in preservice and professional education of teachers.

- Productions range from broadcast television promotional or documentary films about educational ideas, events, and innovations, to raw classroom footage that may be used by practicing teacher study groups or for discussion in a teacher education course. All of these types of video can have important roles to play in enhancing the study of teaching, yet their various designs and uses are not currently well understood.

- The sophistication of practice, and the relationship between research and practice in teacher education can be improved by the "study" of video records. For example, teachers can better incorporate responses to students' ways of thinking into instruction because they can capture and replay fast-paced classroom communication for later analysis.

- Talking about concrete instances of practice in video records appears to provide a context for learning to articulate elements of practice in more sophisticated ways. In other words, video helps teachers put words to invisible parts of practice. For example, through repeated viewing of a whole class discussion, teachers can begin to

describe the many complex "moves" a teacher makes to keep the discussion on track and productive of learning.

B. Knowledge about and systematic coordination of existing video and multimedia for the study of teaching is currently poor.

- There is no full picture of where video and other multimedia records of teaching and learning exist or of the relative quality of what exists.

- The ways in which teacher educators/staff developers teach with these kinds of resources has not been systematically studied. Research is needed on the facilitator's role in the development of professional expertise and on the role of the media in their work so that knowledge of promising practices can be shared.

- The ways in which teachers learn from these kinds of resources has not been systematically studied. Research is needed on the practitioner's role in learning with new media and on the development of their professional expertise so that knowledge of promising practices can be shared.

- The knowledge that we do have about how to effectively make and use multimedia materials for the study of teaching is not widely shared among teacher educators/staff developers, teachers, researchers, or media producers.

- A number of people in different places, and with different disciplinary emphases (e.g. teacher educators/staff developers, educational researchers, video producers, anthropologists, cognitive scientists) have been producing classroom video and video about teaching and learning for many years, but there is very little coordination among or across these efforts.

- While a substantial amount of video material about teaching and learning has accumulated, there is no cataloguing strategy that is widely shared, and annotation systems have not been developed or discussed other than in idiosyncratic ways.

- We do not have standards for figuring out what or how multimedia products should be shared. (e.g. fully edited products? elements of video and other supporting

representations? knowledge about effective designs?) Nor is there a culture of shared resources in higher education generally and teacher education specifically.

- The cost of everyone building video and multimedia resources from scratch is prohibitive; even as the technologies become increasingly easy to use, the time it takes to create good materials and the requisite sophisticated design skills are relatively rare in their distribution.

- There is some concern that what exists may not reflect diverse teaching strategies and circumstances, or portray education from the perspectives of diverse learners.

C. The ways in which new media are and could be used in teacher development and professional education are little understood.

- Very little is known in many cases about:
  —what happens to materials after they are produced;
  —effective designs for multimedia materials in relation to different or multiple purposes;
  —the kinds of activities, discussions, or contexts that surround effective uses of video and multimedia in support of teacher learning, or;
  —the supplementing of video records by other forms of documentation and by annotations for the purpose of studying teaching.

- There is an unexamined and troublesome tension between using new media to *promote* various approaches to teaching and learning in contrast to using these media to *examine and understand* new approaches.

- Because video materials are open to multiple interpretations, they can produce situations in which the producers intended purposes for the video records are very distant from the uses to which teacher educators put materials.

D. Because of what is newly possible, new issues have arisen for designers and practitioners, and for the interaction between them.

- Technologies have now developed sufficiently to make video and multimedia production capabilities available to novices, yet we have little sense of what it takes to

learn to use these systems appropriately and few models of how they can be well used in teacher education settings.

- Videographers and anthropologists of film/video have substantial understanding of video records as representational forms. This knowledge is not being imported into the design of multimedia for the study of teaching. Teachers and teacher educators need a greater awareness of the ways in which production decisions shape what is communicated as well as knowledge about the problems of constructing interpretations.

- Teaching and learning are more complex than they appear in representations of these practices, even in multimedia formats. The more sophisticated the teaching and learning, the greater the gap frequently seems to be between the experience and its video representation--many aspects of teaching and learning are invisible to the camera's lens.

- Identities of teachers and students cannot be protected in video and multimedia records as they are in print media. Norms and procedures to protect participants (e.g. creating adequate and shared permission procedures for those who are the subjects of classroom and other educational videotaping) is not yet resolved.

- Since teaching is the professional activity and thus "product" of teachers, videotaping and the collection of other records of practice raise challenging issues of intellectual property, credit, and permissions to manipulate. These issues need to be resolved for the protection of the practitioner/producer in any strategy for archiving or making records available in a public venue.

- Capturing high quality audio while maintaining the ecology of complexly organized classrooms is of continuing concern to both designers and practitioners.

3. Next Steps

Based on the promises and problems with using multimedia for the study of teaching that were identified, participants at the workshop made strong arguments for the following next steps to be taken in the field:

- Continue multidisciplinary conversations to further focus and clarify the issues, share expertise, and generate collaborative work.
- Explore the development of (a) video/multimedia archive(s) that would allow sharing and recomposition of video and accompanying material in video and multimedia formats.
- Undertake design research for video and multimedia in the study of teaching.
- Undertake research and development to understand contexts, activities, and uses of existing video and multimedia materials.
- Undertake fundamental research into how teachers learn with video and multimedia modes.
- Support focused technical development.

We elaborate each of these points below, drawing on the contributions of workshop participants.

A. Continue multidisciplinary conversations to further focus and clarify the issues, share expertise, and generate collaborative work.

Participants from the several disciplines relevant to using video and multimedia in the study of teaching got together for the first time at this meeting and realized that they had much to learn from one another to focus their work and inquiries. However, the meeting was much too short to build sustained communication among the surprisingly diverse and mutually isolated participants. Such collaborations could be fostered by convening the same large group again for additional meetings or in coordinated smaller groups. It could include more participants of equally high caliber and reputation, and/or include more junior people in an effort to develop a more integrated approach in the future.

There is no one professional organization/meeting that includes the people represented at this workshop. Assuming video and multimedia will only increase in importance in

relation to the teaching profession for several purposes, we need to figure out how to combine and regularly convene expertise in the now separate professional communities.

The purposes of such continuing deliberations and possible collaborations would include:

- better understanding what is collectively known about design and use of video for professional education;
- deliberating about what is sharable and how to share it;
- developing hypotheses about best circumstances of use;
- formulating methods for studying the consequences of video and multimedia work for improving practice in both K-12 teaching and teacher education;
- providing a forum for continuing to think creatively about adapting new technologies as they emerge;
- addressing more thoroughly some of the problems of 'sharability', ownership, and intellectual property;
- developing a common language for talking about all of the above.

The lack of a common language for talking about multimedia in the study of teaching and the lack of a sense of shared purposes (both of which were very evident in our two-day workshop) supports the argument for more face-to-face contact across interest groups rather than a new journal or a web site. It is widely understood among sociolinguists and social psychologists who study the use of communications technologies that interpersonal work on common projects is required to build a basis for sustaining long term productive communication in media with a "smaller bandwidth."

B. Explore the development of (a) video/multimedia archive(s) that would allow sharing and recomposition of video and accompanying material in video and multimedia formats.

In order to make headway on this project, we would need to consider both appropriate physical locations for an archive and network based possibilities. We would need to consider what resources and what social, financial, and institutional arrangements would support the use of an archive for the study of teaching. We would need to develop strategies for addressing several technical, educational, and ethical problems including:

- creating a more or less comprehensive catalogue of material that already exists that might be candidates for inclusion;

- identifying types of material that may be additionally needed, keeping in mind the issues of diversity that were raised by the group;

- developing criteria and processes for soliciting and including material in the archive (in addition to what we already know, probably using cases from the inquiry about what exists to identify key dimensions);

- identifying user groups (e.g. education faculty, practicing teachers, researchers, etc.) and their current and projected needs;

- examining technical archiving options and hardware requirements, and developing a strategy for keeping up with this rapidly developing set of technologies;

- examining networking requirements for on-line use;

- designing cataloguing structures and annotation capabilities;

- designing activities for different archive users and developing the technical support for these activities;

- resolving intellectual property, permissions, and related issues.

Although we can learn from experiences in other domains, most of these problems need to be solved in a way that is particular to the field of teaching and thus can only be addressed in the context of the development of an actual archive(s). Many of these issues can be subject to empirical inquiry once there is a set of materials and an institutional structure in place to support these explorations.

C. Design research for video and multimedia in the study of teaching.

Although a substantial quantity of video material that records teaching and learning exists, it is clear from this meeting that we are still at the beginning of experimenting with how these media can play key roles in improving professional education and the study of teaching. Systematic design research is needed to take full advantage of their potential. We are beginning to have available multimedia learning environments that teachers and teacher educators can use to analyze and annotate records of practice for the study of teaching. These include VideoVisor2 (Digital Lava Inc.) as it is being used in the Video Cases for Mathematics Professional Development Project at San Diego State University, the Student Learning and Teaching Environment and the Records of Practice developed by the Mathematics and Teaching Through Hypermedia Project at the University of Michigan, and the Multimedia Interactive Learning Environment for Primary School Teachers developed at the Freudenthal Institute, Utrecht University, the Netherlands. In each of these environments, users can assemble collections of video clips, scrapbooks of children's work, and amalgamations of teachers' commentaries on practice and link these with their own investigations of practical problems. There is a strong need to understand the design variations among these systems and how teacher educators/staff developers might draw on such resources as well as what prospective and practicing teachers can learn with them to inform future developments.

There was also an expressed need to design activities and contexts for practitioners to learn how to *produce* video/multimedia to represent their own teaching and teaching more generally. No matter what the level of sophistication of the packaging, multimedia for the study of teaching depends on producing appropriate representations, in multiple media. What are the most efficient ways of training people to do so, taking advantage of the knowledge in a discipline/professional sector which seldom connects with education: cinematography and film making? What can be learned from the efforts of practitioners to represent their practice that might be useful in teacher education/professional development?

To make the most efficient progress, new projects in this arena should include collaborative teams who bring the varied expertise needed to the development tasks. In addition, such projects should not be carried out in isolation from one and other, as has more or less been the case to date. Strategies and structures for progress and materials to be actively shared are also needed.

Such future projects should include practitioners (teachers, teacher educators) as key participants, and include careful analyses of the reactions and consequences of these audiences to new designs. They should also include a demonstrated use of the findings of extant research on teacher learning.

A portfolio of design projects might also include non-technical professionals (i.e., teachers, teacher educators, staff developers) working with the vastly simpler production technologies now available. We need to examine what it takes for these technologies to be broadly used throughout the education profession to design and produce as well as consume material. What is entailed in developing such design skills? What do practitioners learn from designing and creating materials (to represent their own work, for example)? How is the learning that can be gained from this approach substantially different from what is learned by viewing/discussing the videotaped work of others?

D. Undertake research and development to understand contexts, activities, and uses of existing video and multimedia materials.

In addition to furthering innovative design and development of multimedia materials for the study of teaching, research should address how they are most productively used in preservice education, in professional development contexts, and for credentialling purposes. What activities best surround using videotape and multimedia to represent, examine and further develop understanding of complex teaching practices? What can we learn from the practice of successful users of these materials about their contribution to the curriculum of teacher education/staff development and instruction in teacher education/staff development? What constitutes a useful repertoire of skills for the teacher educator/staff developer who makes use of multimedia?

There was general agreement at the meeting that while straightforward viewing/exploration of materials was valuable, they were far more powerful when used in the context of discussions, assignments, and other tasks that involved deliberation with others and/or composition or analysis activities. We know too little about the kinds of contexts, activities, and supporting materials that are most productive—as part of preservice curriculum, professional development, or the study of teaching by researchers and practitioners. What is the cognitive work that is required to learn from video and other

media, and how do we structure the settings in which people look at these representations so that they will result in teachers acquiring usable knowledge?

There was consensus among the group that new kinds of materials are needed by teacher educators which enable them to engage novices more directly and substantially in complex circumstances of day-to-day classroom practice, developing the language necessary to talk productively about these matters. Many of the workshop participants have had very positive experiences in using video and multimedia, and recommend its unique qualities for these purposes. But beyond these idiosyncratic experiences, there is not yet an assembly of material for use by teacher educators (schools of education and in-service providers), nor sufficient models of and understanding about the role of such material can play in their work—whether it entails formal classes and seminars, workshops, on-line courses or forums. Perhaps more problematic is the lack of opportunities for teacher educators/staff developers to learn to use the materials that are made available. Like good curriculum for K-12 classrooms, good materials for studying teaching will not be effective unless people know how to use them.

We need to know more about what kind of training and support is needed for teacher educators and staff developers to use media-based materials generatively. Members of the group felt strongly that a portfolio of projects in this arena should include attention to questions of media literacy for these audiences. Learning how to use these materials should incorporate consideration of the ways these media capture, represent and communicate information, thus deepening and broadening users' sophistication in "reading" them well. We need to develop a richer culture or protocol for viewing and studying videotapes of classrooms in relation to the goal of teacher learning. Too often, the viewer is quick to criticize and not analyze the teacher's actions and judgments or the student responses. Video would seem to require a different kind of analysis than what one brings to a print medium and the nature of video analysis has not been sufficiently explored.

Participants also recommended that projects address whether and how these media--in addition to helping practitioners "learn to look" at practice in more sophisticated ways--can support the development of an enriched language about teaching. Many felt that the current ways of talking about teaching are impoverished in the face of its complexities, and of the new kinds of practices that are now being promoted in national efforts to reform education. These new practices are not common or familiar to many teachers. The new media provide

concrete referents for new ways of working, and when used in contexts of deliberation and discussion, may be a powerful means for developing the needed language.

E. Undertake fundamental research into how teachers learn with video and multimedia modes.

At the same time that we recognize that multimedia resources cannot be developed for use in preservice and inservice professional education without regard for the extant findings of research on teacher learning, we note that the materials offer an opportunity to do additional research in this field. We lack fundamental knowledge about the processes of professional learning with these enriched environments, especially the development of new understandings that can support future practice. How, for example, can the flexibility of random access media be used to increase the efficiency of learning about complex practice? How does teacher learning in multimedia environments compare with learning from cases available in print? We have little knowledge of the comparative strengths and weaknesses of these approaches.

F. Support focused technical development.

Further technical work is needed on two immediate issues that especially bedevil production and use of multiple media for the study of teaching.

(1) In the noisy and multiple circumstances of classrooms, audio quality often suffers. Many viewers will tolerate less-than-broadcast quality video (although the general conclusion is that relatively high quality video is now possible by amateurs with training), but are intolerant of poor audio. At the same time, practitioners felt that it is often hard to hear in classrooms "in person" and that this aspect of teacher uncertainty should be appropriately represented rather than being technically corrected. Experiments in/development of low-end audio technologies, with recommendations for straightforward strategies for obtaining appropriate audio quality in classroom circumstances are needed.

(2) One of the most effective ways of sharing video/multimedia materials and deliberating about them in professional communities is likely to be via electronic networks. Research and development is needed in both technical and communicative/social aspects of developing knowledge networks for these purposes.

With respect to other technical developments that would be needed to support the study of teaching, most useful would be investigations of how the best and simplest current production tools to understand how these can be used by those other than professional producers and research and development teams. Participants noted that the best strategy for moving forward in a quickly changing technical arena is one that focuses on: "building as little as possible and borrowing as much as possible". As the technologies rapidly evolve, the "field" needs to explore technologies being used in other sectors that could be adapted to its goals. Keeping apprised well in advance means developments that have potential could be more rapidly incorporated into research and development cycles.

4. Recommendations

The National Science Foundation can play an essential role in moving work ahead on several fronts. We believe that the NSF is especially well positioned to address needs in five categories:

(1) Support for fundamental research on how teacher educators/professional developers teach with and how teachers learn from video and multimedia enriched environments.

(2) Support for the research and development that is needed to create a national archive, or system of archives, of high quality video and multimedia materials, as described in Section 3.b. above, leading to full implementation.

(3) Support for the continuing development of a professional community around these issues. As noted above, members of the workshop group concur that successful development of technologies for the study of teaching requires multi-disciplinary deliberation and collaboration of the sort that now happens opportunistically and often is confined to single institutions and single disciplines. The resulting set of "postholes" does not advance the field effectively. The development of a professional community requires further structured convening opportunities, and support for collaborative projects.

(4) Support for a portfolio of multidisciplinary research and development projects:

- Innovative design, research and development of video and multimedia for the study of teaching for a range of purposes and contexts.

- Research and development about contexts and activities that use video and multimedia to best advantage in preservice education, professional development, professional credentialling, and research about teaching.

- Production and consumption of research around the role of video/multimedia representation in teacher learning as understood from a range of perspectives e.g. anthropological, communications, psychological, technical.

(5) Addressing technical challenges related to using multimedia to study teaching: support for experimentation with low-end audio technologies for recording classrooms well; exploration of knowledge networking organized around video that is adapted to the problems of improving teacher education and the study of teaching.

Appendix A
New Technologies for the Study of Teaching Workshop Participants

Conveners

- **Magdalene Lampert, University of Michigan**
  Professor, School of Education
  610 E. University, 4113 SEB
  University of Michigan
  Ann Arbor, MI 48109-1259
  http://www.umich.edu/
  http://www-personal.umich.edu/~jmerz/MATHproject/math.html

- **Jan Hawkins, Education Development Center, Center for Children & Technology**
  Director
  EDC/CCT
  96 Morton Street
  New York, New York 10014
  http://www.edc.org/CCT/ccthome/message.html

Invited Participants

- **Amy Adams, Ravenna Elementary**
  National Board Certified Teacher
  7340 Infirmary Rd.
  Ravenna, OH 44266
  http://www.nbpts.org/

- **Deborah Ball, University of Michigan**
  Professor, School of Education
  University of Michigan
  4119 School of Education
  610 E. University
  Ann Arbor, MI 48109-1259
  http://www.umich.edu/

- **Carne Barnett, WestEd**
  WestEd Laboratory, Oakland Branch
  500 12th Street Suite 340
  Oakland, CA 94607
  http://www.wested.org/

- **Hyman Bass, Columbia University**
  Professor of Mathematics
  Columbia University
  New York, NY 10027
  http://www.columbia.edu/

- **Kathy Beasley, Teacher, Elliott Elementary School**
  Elliott Elementary
  Holt, MI 48842
  http://ncrtl.msu.edu/

- **Chuck Cascio, National Board for Professional Teaching Standards (NBPTS)**
  Director of Certification Standards, NBPTS
  1730 Rhode Island Ave. NW, Suite 909
  Washington, DC 20036
  http://www.nbpts.org/

- **Milton Chen, George Lucas Educational Foundation (unable to attend)**
  Executive Director, The George Lucas Educational Foundation
  PO Box 3494
  San Rafael, CA 94912
  http://glef.org/

- **Ted Chen, MacArthur Foundation**
  The John D. and Catherine T. MacArthur Foundation
  140 S. Dearborn St. Suite 1100
  Chicago, IL 60603
  http://www.macfdn.org/

- **Allan Collins, Northwestern University and BBN Technologies**
  BBN Technologies
  733 Concord Ave.
  Cambridge, MA 02138
  http://www.bbn.com/products/educate.htm

- **Debi Corbin, Teacher, Elliott Elementary School**
  Elliott Elementary
  Holt, MI 48842
  http://ncrtl.msu.edu/

- **Ellen Davidson, EDC (Education Development Center)**
  Senior Teaching Associate, Center for Development of Teaching
  EDC, Education Development Center
  55 Chapel St.
  Newton, MA 02158
  http://www.edc.org/home.html/

- **Helen Doerr, Syracuse University**
  Assistant Professor Mathematics and Mathematics Education
  Syracuse University, Mathematics Department
  215 Carnegie Hall
  Syracuse, NY 13244-1150
  http://www.syr.edu/

- **Frederick Erickson, University of Pennsylvania**
  Professor, Graduate School of Education
  Center for Urban Ethnography
  3700 Walnut Street
  University of Pennsylvania
  Philadelphia, PA 19104
  http://www.gse.upenn.edu/cue/

- **Barry Fishman, University of Michigan**
  Assistant Professor, University of Michigan
  School of Education
  610 E. University, 1228D SEB
  Ann Arbor, MI 48109-1259
  http://www-personal.umich.edu/~fishman/

- **Susan Florio-Ruane, Michigan State University**
  Professor
  College of Education, 305 Erikson Hall
  Michigan State University
  E. Lansing, MI 48824
  http://www.msu.edu/
  http://ncrtl.msu.edu/

- **John Frederiksen, University of California-Berkeley**
  Principal Research Scientist, Educational Testing Service
  Adjunct Professor of Education, UC Berkeley
  1000 Broadway, Suite 310
  Oakland, CA 94623-2306
  http://www.ets.org/verity/vdkw_cgi/xb0807d72-14258/Search/5825736/2#HL0
  http://www.berkeley.edu/

- **Fred Goffree, University of Amsterdam, The Netherlands**
  Prof. dr.
  Freudenthal Institute
  Tiberdreef 4
  3561 GG Utrecht
  the Netherlands
  http://www.fi.uu.nl/mile/

- **Ricki Goldman-Segall, University of British Columbia**
  Faculty of Education
  Department of Curriculum Studies
  2125 Main Mall
  University of British Columbia
  Vancouver, BC V6T1Z4
  http://www.merlin.ubc.ca/

- **Paul Goren, MacArthur Foundation**
  MacArthur Foundation
  140 S. Dearborn St. Suite 1100
  Chicago, IL 60603
  http://www.macfdn.org/

- **Fadia Harik, BBN Technologies**
  Senior Scientist, Learning Systems and Technologies
  BBN Technologies
  70 Fawcett Street
  Cambridge, MA 02138
  http://www.bbn.com/products/educate.htm

- **Sylvia Hayden, Bellevue, Washington Public Schools (unable to attend)**
  Off Campus High School
  14200 Southeast 13th Place
  Bellevue, WA 98007
  http://belnet.bellevue.k12.wa.us/

- **Paula Hooper, Rockefeller Foundation**
  Rockefeller Foundation
  420 5th Avenue
  New York, NY 10018-2729
  http://rockfound.org/

- **Anthony Kelly, National Science Foundation**
  Program Director, National Science Foundation
  REC, EHR
  Stafford Building, Suite 855
  4201 Wilson Blvd.
  Arlington, VA 22230
  http://www.ehr.nsf.gov/

- **Joe Krajcik, University of Michigan**
  Associate Professor of Science Education
  School of Education
  610 E. University, 1323 SEB
  University of Michigan
  Ann Arbor, MI 48109-1229
  http://hi-ce.eecs.umich.edu/

- **Carol Lee, Northwestern University**
  Professor in the School of Education & Social Policy
  Annenberg Hall, Northwestern University
  Evanston, IL 60208
  http://www.nwu.edu/

- **Xiaodong Lin, Vanderbilt University**
  Assistant Professor, Education and Human Development
  Department of Teaching and Learning &
  Learning Technology Center
  Social Religious Building RM. 043
  Vanderbilt University
  1930 S. Drive,
  Nashville, TN 37203
  http://peabody.vanderbilt.edu/peabody/

- **Valerie Mills, Ann Arbor Public Schools**
  Mathematics Curriculum Coordinator
  Ann Arbor Public Schools
  2725 Boardwalk Rd
  Ann Arbor, MI 48104
  http://aaps.k12.mi.us/

- **Jean Moon, Exxon Foundation**
  Professor, Lesley College
  Advisor to Exxon Education Foundation Mathematics Education Program
  321 Reedy Meadow Road
  Groton, MA 01450
  http://www.exxon.com/exxoncorp/main_frame_3.html
  http://www.lesley.edu/

- **Ricardo Nemirovsky, TERC (Technical Education Research Centers)**
  TERC
  2067 Massachusetts Ave.
  Cambridge, MA 02140
  http://www.terc.edu/projects/projects.html

- **Wil Oonk, Hogeschool van Amsterdam, The Netherlands**
  Freudenthal Institute
  Tiberdreef 4
  3561 GG Utrecht
  the Netherlands
  http://www.fi.uu.nl/mile/

- **Lauren Pfeiffer, Maple Elementary School**
  Teacher and Researcher
  217 Oakbrooke Drive #2
  South Lyon, MI 48178
  http://ncrtl.msu.edu/

- **Nichole Pinkard, University of Michigan**
  Assistant Professor, University of Michigan
  School of Education
  610 E. University, 1228E SEB
  Ann Arbor, MI 48109-1259
  http://www-personal.umich.edu/~pinkard/homepage/

- **Nora Sabelli, National Science Foundation (unable to attend)**
  Senior Program Director, National Science Foundation
  Stafford Building, Suite 855
  Directorate for Education and Human Resources
  4201 Wilson Blvd
  Arlington, VA 22230
  http://www.ehr.nsf.gov/

- **Deborah Schifter, EDC (Education Development Center)**
  Senior Scientist, EDC
  55 Chapel Street
  Newton, MA 02158
  http://www.edc.org/home.html/

- **Marty Schnepp, Holt High School**
  Holt High School
  1784 Aurelius
  Holt, MI 48842

- **Matt Schneps, Harvard-Smithsonian Center for Astrophysics**
  Science Education Department
  Harvard-Smithsonian Center for Astrophysics
  60 Garden Street
  Cambridge, MA 02138
  http://www.learner.org/collections/mathsci/teachers/

- **Nanette Seago, California Mathematics Renaissance K-12**
  Video Study Director CA Mathematics Renaissance K-12
  6179 Oswago
  Riverside, CA 92506
  http://www.ehr.nsf.gov/ehr/esr/sysinit/ca.htm

- **Carole Shank, Holt High School**
  4172 Red Cedar Road
  Okemos, MI 48864

- **Jill Shoda, Thomas Paine School**
  First and Second Grade Teacher Thomas Paine School
  1509 Rutledge
  Urbana, IL 61802
  http://www.cmi.k12.il.us/Urbana/tp/

- **Rand Spiro, University of Illinois**
  Professor, Educational Psychology
  Affiliate, Beckman Institute for Advanced Science and Technology
  Director, Cognitive Flexibility Laboratory
  University of Illinois at Urbana-Champaign
  Department of Educational Psychology
  1310 S. 6th Street
  Urbana, IL 61801
  http://www.ed.uiuc.edu/BER/FacultyResearchInterests/EdPsych/Spiro/Rand_Spiro.html

- **Jim Stigler, University of California, Los Angeles**
  Professor of Psychology, UCLA
  Psychology Department
  Franz Hall
  Los Angeles, CA 90095-1563
  http://stratus.lifesci.ucla.edu/psychology/Faculty/Stigler/indexold.html

- **Stephanie Teasley, University of Michigan**
  Assistant Research Scientist
  Collaboratory for Research on Electronic Work
  University of Michigan
  701 Tappan Street
  Ann Arbor, MI 48109 - 1234
  http://crew.umich.edu/

- **Beth Trivelli, Kent Elementary**
  National Board Certified Teacher
  1595 Chadwick Dr.
  Kent, OH 44240
  http://www.nbpts.org/

- **Beth Warren, TERC (Technical Education Research Center) (unable to attend)**
  Co-Director, Cheche Konnen Center
  TERC
  2067 Massachusetts Ave.
  Cambridge, MA 02140
  http://www.terc.edu/projects/projects.html

- **Patricia Wasley, Bank Street College**
  Dean, Graduate School of Education
  Bank Street College
  New York, NY 10023
  http://www.bnkst.edu/

- **Joy Whitenack, University of Missouri**
  Professor, University of Missouri
  Curriculum and Instruction
  212 Townsend Hall
  Colombia, MO 65211
  http://www.missouri.edu/~cijw/

- **Raul Zaritsky, National Computational Science Alliance**
  Education Division
  National Computational Science Alliance
  University of Illinois Urbana Champaign
  605 East Springfield
  Champaign, IL 61820
  ** http://www.ncsa.uiuc.edu/Cyberia/DVE/FusionDVE/index.html
  http://www.ncsa.uiuc.edu/People/raulz/html/projects.html

Workshop Associates

Teresa McMahon, University of Michigan http://hi-ce.eecs.umich.edu/
Merrie Blunk, University of Michigan
Mark Hoover, University of Michigan
Deidre LeFevre, University of Michigan
Jennifer Lewis, University of Michigan
Alice Merz, University of Michigan
Jim Merz, University of Michigan http://www-personal.umich.edu/~jmerz/
Geoff Phelps , University of Michigan
Ed Wall, University of Michigan
Raven Wallace, University of Michigan http://www-personal.umich.edu/~ravenmw/

610 E. University, 4113 SEB
University of Michigan
Ann Arbor, MI 48109-1259

Appendix B

New Technologies for the Study of Teaching

Agenda for Wednesday, June 10

8:30 **Light Breakfast**
Room 2228, School of Education

9:00 **Design Activity using SLATE**
Multimedia Classroom 2, Room 2229, School of Education

Working in pre-assigned groups, teams will design a professional development opportunity to study teaching that uses multimedia records of practice. Participants will use resources available in Space for Learning and Teaching Exploration (SLATE), a multimedia environment for exploring teaching and for authoring multimedia work. The purpose of this activity is to surface and examine assumptions about aspects of the work we have come together to discuss.

10:30 **Break**
Refreshments available in Room 2228, School of Education

10:45 **Design Activity continues**

12:00 **Lunch**
Tribute Room, Room 1322, School of Education

1:00 **Debrief morning activity and discussion of design issues**

Multimedia Classroom 2, Room 2229, School of Education

2:30 **Exhibition: Analysis of Existing Work in Progress**
(Details on following page)

3:30 **Large Group Discussion**
Multimedia Classroom 2- Room 2229

4:30 **The Other Side – Issues from in front of the camera.**
Multimedia Classroom 2- Room 2229

5:00-6:00 **Breakout Sessions with Teachers**

7:00 **Dinner at Zanzibar**

Exhibition - The exhibition is an opportunity to explore a number of applications and videos which participants have brought with them. Descriptions of the various offerings provided on a separate handout. Refreshments in Room 2228 throughout Exhibition.

2:30-3

"Illustrations of Cultural Modeling"
Carol Lee, Northwestern University
Room 2232

"Learn and Live"
Milton Chen, George Lucas Foundation
Room 2214

"The Harvard-Smithsonian Case Studies in Science Education"
Matt Schneps, Harvard Smithsonian Astronomical Observatory
Room 2218

"Points of Viewing Children's Thinking"
"Constellations" and "Learning Constellations"
Ricki Goldman-Segall, University of British Columbia
Multimedia Classroom 1

"Digital Video for Education Web Site"
Raul Zaritsky, National Computational Science Alliance
Multimedia Classroom 1

3-3:30

"Video Case – Teacher Inquiry into Student Learning"
Representative for Beth Warren, TERC
Room 2232

"Illustrations of ThinkerTools Inquiry Curriculum"
John Frederiksen, ETS and UC-Berkeley
Room 2214

"Mathematical Inquiry through Video"
Fadia Harik, BBN Technologies
Room 2218

"Children's Numerical Reasoning" a CD-ROM
Joy Whitenack, University of Missouri
Multimedia Classroom 1

"Records of Practice"
Magdalene Lampert and Jim Merz
Multimedia Classroom 1

New Technologies for the Study of Teaching

Agenda for Thursday, June 11

8:30 **Light Breakfast**
Brownlee Room (#2327), School of Education

9:00 **Examining Three Approaches to Multimedia**
Multimedia Classroom 2, Room 2229, School of Education

CaPPs
Joe Krajcik, University of Michigan

Multimedia Interactive Learning Environment for Future Primary School Teachers
Frederick Goffree, University of Amsterdam
Wil Oonk, Hogeschool van Amsterdam

Video Visor 2/Digital Lava as used in Video Cases for Mathematics Professional Development Project
Nanette Seago, CA Mathematics Renaissance K-12
Jim Stigler, UCLA

10:30 **Break**
Refreshments available in Brownlee Room (#2327), School of Education

10:45 **Future Directions for Research, Development, and Use**
Small group discussion (see following page)
Start in Multimedia Classroom 2, Room 2229, School of Education

12:00 **Lunch**
Tribute Room, School or Education

1:00 **Reports from Small Groups and Synthesis**
Multimedia Classroom 2, Room 2229, School of Education

3:00 **Conclude**

10:45 **Future Directions for Research, Development, and Use**
Start in Multimedia Classroom 2, Room 2229, School of Education

Small group discussion topics:

1. The problem of identifying and constructing knowledge for teaching that will be usable in real classrooms. *Room 2228*
2. The problem of communication within and across groups about the nature of accomplished teaching and the development of skilled teachers. *Room 2214*
3. The problem of identifying and articulating the elements of new approaches to teaching and learning. *Room 2232*
4. The problem of professional isolation. *Room 2302*
5. The problem of teachers' resistance to interventions and evaluations from outsiders to their practice. *Multimedia Presentation Room*
6. The problem of making archives of multimedia records of classroom practice broadly available for the improvement of teaching and understanding of effective teaching and learning. *Multimedia Classroom 1*
7. The problems associated with choosing examples of teaching and learning to be the subject of collections of multimedia records of practice. *Multimedia Classroom 2*