



ANNUAL REPORT FOR AWARD # 0353402

Frank A Moretti ; *Columbia University*

Video Interactions for Teaching and Learning (VITAL): A Learning Environment for Courses in Early Childhood Mathematics Education

Participant Individuals:

CoPrincipal Investigator(s) : Herbert P Ginsburg

Senior personnel(s) : Rochelle G Kaplan; Maurice Matiz; Peter Sommer

Graduate student(s) : Janet Eisenband; Susan Jang; Anita Kumar; Michael Preston

Other -- specify(s) : Rae S Brosnan

Senior personnel(s) : Ryan Kelsey

Participants' Detail

Partner Organizations:

Teachers College, Columbia University: Facilities; Collaborative Research; Personnel Exchanges

William Paterson University: In-kind Support; Facilities; Collaborative Research; Personnel Exchanges

CUNY Hunter College: In-kind Support; Facilities; Collaborative Research; Personnel Exchanges

Other collaborators:

Arthur Barody, Ph.D. (External Reviewer), Professor of Mathematics Education at the University of Illinois at Urbana/Champaign.

Cornelia Brunner, Ph.D. (Formative and Summative Evaluator), Associate Director, Center for Children and Technology, Education Development Center, Inc.

Activities and findings:

Research and Education Activities:

INTRODUCTION

We are pleased to present NSF with a report on our first two years of work on the project Video Interactions for Teaching and Learning: A Learning Environment for Courses in Early Childhood Mathematics Education (VITAL: ECME, ESI-0353402). The goal of the VITAL: ECME project is to contribute to the improvement of early childhood mathematics education nationwide by creating model courses for colleges and universities. These courses are rooted in a Web-based environment designed to support the development of understandings and related skills that early childhood educators need to provide sound

instruction in mathematics, a topic seldom taught at this age level.

The content and methodology of VITAL: ECME are based on mathematics education courses taught by Prof. Herbert Ginsburg (Co-PI) at Teachers College, Columbia University. The courses employ learning activities using video cases to help prospective and practicing teachers learn to understand the development of young children's mathematical thinking and learning, and to analyze the thinking and learning of individual children. The learning activities help prepare teachers to more critically examine early mathematics instruction and to develop pedagogical approaches based on an understanding of children's mathematical cognition. The VITAL: ECME project will provide faculty at other institutions with the means to adapt existing courses and to create new courses based on the developed model.

Since the project began in June 2004, the CCNMTL team, under the direction of Prof. Frank Moretti (PI), has been working closely with our current partners at Teachers College and William Paterson University, and new partners at Hunter College of the City University of New York, to create the model courses. These activities include the development of a significant extension of the existing video library, and, based on our experience over the past two years, a redevelopment of the VITAL learning environment aimed at improving its pedagogical design and its accessibility to the broad range of educators who will be using it. To facilitate this effort we have enlisted the contributions of faculty from Hunter College of the City University of New York who teach specifically at the undergraduate level. Under the direction of Dr. David Steiner, Klara and Larry Silverstein Dean of the School of Education, we have included Prof. Anne M. Ediger from the Department of Curriculum and Teaching and Prof. Sherryl Browne Graves from the Educational Foundations and Counseling Programs. Profs. Ediger and Graves bring unique perspectives in both the subject of early childhood education and also in the education of undergraduate students.

Our first year of design research has led to more ambitious goals than originally stated in our proposal. We have begun working to ensure that our partners have opportunities to contribute to the project that they will be responsible for administering in their own institutions. We have also committed to developing the VITAL learning environment in the context of an expanded multi-university consortium, with the intention of making the digital learning environment and courses more representative of the diversity of locations in which it will be used in its national dissemination.

GOALS AND OUTCOMES

This report will document our progress in the following areas:

Course Development

A key outcome of the project is a set of courses in early childhood mathematics education for graduate and undergraduate students, each of which will include: (1) syllabi that can be tailored to specific curricular contexts, time constraints, and audiences; (2) readings from methodological, educational, and psychological research; (3) student assignments that correspond to topics in the syllabi and instructors' specific learning goals; and (4) a guide to the materials and to teaching the course.

Content Creation

To provide faculty and students with a greater range of examples of different behaviors in diverse settings, we are expanding our video library from 45 video clips to approximately 150 that capture children's mathematical thinking in clinical interview, classroom, and

play settings. Students will be able to access specific videos for each class as well as from the entire library.

Software Development

The new VITAL learning environment is being developed based on extensive design research on how it was used in different settings over the last two years, usability considerations, and new models of student engagement that create a community of learners on the Web and in the higher education classroom.

Assessment and Evaluation

We are designing and testing the first round of formative assessment tools to be deployed in the 2006-2007 academic year and are conducting usability testing of all new VITAL learning environment designs. We are reviewing the literature and examining other applications as part of an ongoing effort to expand the research base on the pedagogy of teaching with video and Web-based learning environments.

Partner Engagement

We have increased the participation of our partners at Hunter College of the City University of New York in the development of the undergraduate curriculum. We are also engaged in an ongoing dialogue with our partners that is facilitated by the VITAL: ECME Partner Web site where they can receive project updates, curriculum materials, and other documentation, as well as submit their contributions. This space enables early access and dialogue around new videos, proposed syllabi and curricula, and VITAL learning environment designs.

ACTIVITIES AND FINDINGS

Course Development

Our Year 1 efforts focused on defining the scope of the course(s) and developing an understanding of the settings in which it would be offered. We began our first round of revisions to the existing course at Teachers College and completed them in the first part of Year 2. Our present focus has been to implement and evaluate the course in practice at Teachers College and at William Paterson University with the intention of refining its content and structure as well as projecting the types of support and modifications that will be required for implementation at other institutions. Our partners at Hunter College of the City University of New York (CUNY) have taken a more prominent role in refining the undergraduate curriculum that will be tested in the 2006-2007 academic year.

Test courses. The new courses were first offered in Fall 2005 at the graduate level in both universities. Prof. Ginsburg's course at Teachers College, the Development of Mathematical Thinking, was offered in the Department of Human Development to students mostly in the Early Childhood Education program and stressed the developmental and cognitive foundations of children's mathematical learning, with pedagogy and curriculum as secondary considerations. Prof. Kaplan's course at William Paterson University, Mathematics for Young Children, was offered in the education department and focused more on mathematics teaching methods and curriculum with psychology content as a secondary consideration, but integrated throughout as supportive material. These two approaches serve as a basis from which we will ultimately offer three distinct approaches to the graduate level course: undergraduate, early graduate, and advanced graduate courses. All of the courses will address the foundation of children's mathematical thinking and will apply that knowledge to the analysis of teaching and pedagogy in the classroom. Our challenge and current

efforts focus on creating a solid yet flexible structure that provides the appropriate level of detail for each of the three course levels. Building this flexibility into the VITAL: ECME curriculum will ease its adoption by diverse programs and courses.

The curriculum development team spent approximately six months revising the course leading up to the September 2005 offering. The goal was to examine and validate the sequence, content, and assignments of each week in the syllabus. In particular, the assignments were substantially revised to help students make more explicit connections between what they were learning and their teaching practice. This was accomplished primarily by providing practical opportunities to work directly with children and requiring that these field experiences be included in their responses to course-based assignments.

Course review. Prof. Ginsburg's course was attended by nearly 50 students, who were primarily in the early childhood program with a number of mathematics education, special education, and psychology students as well. The curriculum development team met weekly to debrief in order to document effective pedagogical and organizational strategies and to refine the course in preparation for its offering during the Fall 2006 semester. Teachers College developmental psychology faculty member Ann Cami, who uses the VITAL learning environment in her infant and child development courses, joined the weekly discussions to offer additional child development perspectives on teaching with the learning environment.

The weekly discussions allowed the team to begin to anticipate the support that will be required by faculty partners who adopt the course. For example, while teaching with video is not new, Prof. Ginsburg's approach—modeling close viewing in class and leading a 'social cognition' exercise in which students offer and defend their interpretations—requires a technique that takes time for faculty to develop. VITAL: ECME encourages this kind of in-class activity because students have already viewed many of the videos and are prepared to discuss their analysis. The development of the agile instructional skills needed for this kind of classroom interaction requires special support (for example, videos of this kind of college level teaching) that we will attempt to provide.

The curriculum team's weekly discussions also noted the impact of student background (early childhood versus mathematics or special education) on attitude and performance in the class. The early childhood students, who are the project's primary target audience, tended to be somewhat resistant to the psychology material focusing on children's mathematical thinking; they were more eager to hear about applications for classroom teaching. The finalized model course will reflect these considerations in the variety of content and learning activities available to students. In particular, every effort will be made to introduce the cognitive psychology of mathematics learning within the context of practical applications to the classroom. The course will also include materials provided directly to the faculty that explain the approach, the range of its possible inflections, and potential outcomes.

Our partners from Hunter College have contributed significantly to our understanding of curriculum for the model courses. The CUNY system trains the majority of NYC public school teachers, and Hunter offers extensive programs in undergraduate and graduate-level teacher education. VITAL partner Prof. Joon Lee, a former doctoral student of Prof. Ginsburg, oversees the mathematics courses in Hunter's Early Childhood Education program as well as their Clinical Experiences

Early Childhood program. We have been working with her and with members of the Department of Curriculum and Teaching to ensure that the courses have a wide applicability to non-specialized courses.

Offsite implementation. At William Paterson University, Prof. Rochelle Kaplan used the VITAL: ECME materials and environment one year ahead of schedule to begin integrating its resources into her course. Her use of the VITAL learning environment helped the CCNMTL project team identify the challenges of supporting the software at a new site, such as the need to train local IT staff and to specify minimum requirements for running the software on a network. It was also helpful to see a different implementation of the course in another environment as we work toward making the pedagogy of VITAL: ECME more explicit for audiences beyond the group who created it.

We anticipate that the formal implementation of the undergraduate and graduate curricula at Teachers College, Hunter College, and William Paterson University beginning in Fall 2006 will help us gain a better understanding of factors such as curriculum, pedagogical approaches, user training and support, and technical implementation issues in order to provide better support for future implementations.

Content Creation

As scheduled in our project proposal, the final round of videotaping and editing will begin in Spring 2006 with completion of the final video by Summer 2006. We expect to have more than 60 hours of video footage and 400 video clips from which to select approximately 150 final video clips for inclusion in the VITAL digital library.

Work to date. In Spring 2005, we began videotaping at three schools, focusing on pre-K and kindergarten classrooms. The videos include clinical interviews with children, free play, and teacher-led instruction. We edited 30 hours of video footage into nearly 200 'selects,' or video clips, that are candidates for the VITAL learning environment materials library. Many of these clips were tested in the Fall 2005 course at Teachers College: prior to attending weekly class sessions, students studied specific videos in the VITAL learning environment. In class, students watched new video, applying concepts they had practiced in the VITAL learning environment using the library of old material.

Our Year 2 efforts have been to compile and develop new material to videotape (including specific teaching events, naturalistic observations, and clinical interviews), and to recruit additional schools to videotape with first and second grade classrooms. We will begin shooting at a minimum of three locations in New York City and New Jersey in Spring 2006.

Mathematics content. Our current index of video clips covers topics relevant to the earliest grades, such as numbers, counting, concepts of more and less, and informal arithmetic. Because formal instruction is fairly limited at this stage, most of the videos are clinical interviews between a researcher and a child in which the child performs a series of tasks, and the researcher asks questions uncover his or her thinking. The content also includes many examples of free play in which children build structures from blocks, make patterns, complete puzzles, and perform other activities.

In videos of the first and second grades, our attention will shift to topics such as symbolic representations of math, calculations and procedures, math facts, and more formal types of curriculum. We will also capture more examples of teacher-led instruction, followed by

interviews with children to assess their learning and show the tremendous variation of understanding that can result from a single lesson.

Diversity considerations. Because the target population for the project is early childhood educators from across the country who will teach children from a range of socio-economic and ethnic backgrounds, we have selected schools that reflect diversity in race and ethnicity, gender, religion, and socio-economic status. Our pre-K and kindergarten schools included a Head Start program with primarily African-American and Latino children and a Catholic school with children of many backgrounds. Schools slated for our Spring 2006 videotaping are located in Harlem and Morningside Heights, NY and Passaic, NJ, with children of diverse backgrounds.

Other considerations we have addressed in our videotaping include children of different abilities within a single classroom, as well as different instructional approaches between classrooms. Clips illustrating differences in children's abilities and teachers' instructional approaches will enable instructors to provide assignments that focus on comparisons of these factors. As a result, students will be better prepared for the diversity they will encounter when they are teachers.

Software Development

In the first two years of the grant period, our conception of the VITAL learning environment has evolved largely as a result of our design research process, which is an iterative cycle of research, development, implementation, and assessment. While a solid pedagogical foundation underlies the design of the learning environment, our understanding of how students and faculty engage with the learning environment, and how the environment supports that engagement, has matured but also raised a number of new questions. These new questions, which are listed in the following section, have direct implications for the curriculum and the learning environment, and the project's external evaluator from the Center for Children and Technology (CCT) is working with us to systematically examine how the VITAL environment supports learning. These activities began informally in Fall 2004 and continued through late Fall 2005. As specified in our grant proposal, our usability testing activities began formally in Spring 2006 and will continue through Fall 2006.

Design research questions and usability testing. Our examination of the learning environment in the context of design research has focused on three primary questions:

1. How does a faculty member's pedagogy evolve as a result of teaching with the environment, and what implication does that have for the environment itself?
2. How do students interact with the learning environment (i.e., how well can they perform the actions they need to in the environment), and how should the environment change to better support student work?
3. What new technologies can help us to provide greater support for students to achieve their learning goals?

To answer the first two questions, we conducted a number of different activities: usability tests including the direct observation of students using the environment; single and group interviews of students and faculty; surveys; and the analysis of students' notes and assignments in the environment. Our findings from the usability testing direct observations and interviews of students and faculty led to clear improvements in the design of the environment, such as

streamlining how students annotate video and incorporate those annotations into their assignment. Other findings generated new questions, such as how explicitly the environment should structure the note-taking and writing processes for students.

Example of our process. Our examination of student process in the VITAL learning environment yielded the question, 'Should students study in the same environment where they complete assignments, or should the study space be completely separate from the writing environment?' We created parallel designs that offered high and low structure to students:

1. A comprehensive workspace in which students study materials and complete assignments in a single location (see page A in the appendix).
2. A divided workspace in which students study materials in one location and complete assignments in another (see pages B-C in the appendix).

We conducted more than eight review cycles of these two designs with the PIs, other faculty who teach with the learning environment, students, educational technologists, designers, and evaluation experts. We also met with faculty not affiliated with the project but who have expertise in related work, such as Prof. Charles Kinzer of Teachers College, who has developed a similar environment called CTELL for language and literacy training.

Based on expert reviews and user feedback gathered during Year 1, we decided to build the comprehensive environment (see page A in the appendix) to be used by Prof. Ginsburg and other partners when they teach the course in Fall 2006. In keeping with the Design Research methodology, this instantiation of the learning environment will lead to further investigations into how it intersects with the curriculum, and how students interact with and use it.

Technical Development. Our technical team has spent more than 1000 hours in Year 2 to revise the environment and incorporate the new designs for use in the Fall 2006 graduate and undergraduate courses. In addition to examining specific designs and features, the team researched advances in Web and video technologies of the last two years.

As discussed in our report last year, the powerful learning features of the VITAL environment require consideration of how the environment will integrate with other web-based software systems used by faculty. These systems include university authentication systems, course management systems (Web-based applications that help faculty provide students with information such as syllabi, assignments, readings, and lecture materials), administrative tools such as electronic grade books, and interactive communication tools such as discussion boards.

In examining how the VITAL learning environment can work with the features offered by these software systems (many of which are proprietary and will not allow new functionality, such as that offered by VITAL), the CCNMTL programming team is exploring the integration of VITAL within the Sakai environment. Sakai is a freely licensed (as opposed to proprietary) course management system that is built using open (not proprietary) software standards. The community development process that Sakai uses allows programmers from multiple institutions to collaborate to develop common as well as unique electronic course resources for faculty and student use. Sakai is currently under development by a nationwide consortium of over 90 universities including MIT, Stanford, Indiana University, and the University of

Michigan. The commitment of such a large number of institutions ensures the longevity and success of Sakai in supporting faculty and students as they engage with course and research materials via the Web.

Three of our programmers are active participants in the Sakai community, and we have attended two Sakai conferences that have strengthened the belief that Sakai will facilitate VITAL's adoption at institutions nationwide. As part of the Open Knowledge Initiative (OKI), Sakai adopters will use standard methods for bridging Sakai with enterprise systems. Sakai's standardization will potentially enable any participating institution to use the VITAL learning environment.

Usability Testing in Fall 2006. As planned in the proposal, the new VITAL learning environment will be launched and tested in Fall 2006 along with the graduate and undergraduate courses that are currently being developed by the curriculum team. We have added an additional test implementation for the undergraduate course, to occur in Spring 2007 with our partners at Hunter College. The VITAL learning environment will be hosted by Columbia University outside of the Sakai environment while the programming team works to develop a system that can operate independently at other institutions.

Our formative evaluation activities of the new environment will occur formally during the Fall 2006 semester. These activities, originally proposed to take place in Spring 2006, involve 10 students from Prof. Ginsburg's course as they engage in specific tasks designed to test the usability of the new learning environment. (Unforeseeable to us at the writing of the proposal, Prof. Ginsburg's course was not offered during the Spring 2006 semester and was scheduled instead for Fall 2006.) CCT will conduct the usability testing during the first three months of the Fall 2006 semester concurrently with other examinations we are scheduled to conduct, such as the formative evaluation of the new graduate and undergraduate curricula. Based on the data we gather from the usability tests of the VITAL environment, our programmers will work from new specifications to improve the environment.

Assessment and Evaluation

Although our formal assessment and evaluation work does not begin until Fall 2006, we are constructing new instruments to test the impact of VITAL: ECME on student learning in areas such as observation, identification of critical moments, and use of evidence to support arguments. We developed and tested an observation instrument in the Fall 2005 course at Teachers College, and our preliminary data analysis shows that students make important leaps in vocabulary and specificity in identifying and theorizing about children's mathematical thinking.

In Spring 2006, Our CCT evaluator will be conducting usability testing on our new VITAL environment designs, which are currently being developed into prototypes. The results of these tests will inform the designs that are implemented for the Fall 2006 version of VITAL environment. We will select a representative sample of students from Teachers College and other schools at the university to test the new designs.

In Summer 2006, we will enlist our project partners to assist us in the review of model curricula for undergraduate, early graduate, and advanced graduate courses, new video clips, and meeting the requirements of diverse programs and departments.

Partner Engagement

We have enlisted greater collaboration with our partners at Hunter College of the City University of New York (CUNY). Under the direction of Dr. David Steiner, Klara and Larry Silverstein Dean of the School of Education, we have included Prof. Anne M. Ediger from the Department of Curriculum and Teaching and Prof. Sherryl Browne Graves from the Educational Foundations and Counseling Programs. Both faculty bring unique perspectives to the educational requirements of undergraduates, providing guidance to the curriculum team as we refine the undergraduate curriculum.

We have also significantly expanded our interaction with our project partners who advise us on content and curriculum development, evaluate our materials and software, and serve as test sites for our materials and software. Following our official project launch meeting in January 2005, we created the 'VITAL: ECME Partner Web site' to facilitate our interactions with our partners and to develop a sense of community around the project (see page D in the appendix for images of the Partner Web site). The Web site serves as a community space for our partners to receive project updates, curriculum materials including new videos, and other documentation, such as designs for the new version of the VITAL learning environment. The partner collaboration space enables our partners not only to view these materials but also to leave their comments and contribute their own materials.

All of our partners' early and consistent inclusion in project activities will result in a better and more easily distributable product. Currently, our focus is to ensure that our early childhood mathematics curriculum is easily adoptable in various programmatic and course settings: in undergraduate and graduate programs, and in courses in early childhood and mathematics education. We have enlisted partners Joon Lee from Hunter College, Art Baroody from University of Illinois, Susan Golbeck and Roberta Schorr from Rutgers University, Carole Greenes from Boston University, and Rochelle Kaplan from William Paterson University to analyze the courses, departmental considerations, and the programmatic requirements of early childhood education programs at other institutions. Understanding the requirements and demands of different institutions enable us to create curricula that work in a variety of settings. For example, based on one partner's recommendation, we now make a distinction among undergraduate, early graduate, and advanced graduate courses. Recognizing the unique needs and structures of these course levels allows us to build flexibility into the VITAL: ECME curriculum to ease its adoption by diverse programs and courses.

We have also added a new partner from Howard University, Dr. Gerunda Hughes, who is an Associate Professor of Curriculum and Instruction and Program Coordinator of Secondary Education. In October 2005, Dr. Hughes visited CCNMTL to meet the project staff and discuss the work. Dr. Hughes collaborates with two colleagues at Howard, Drs. Fang Wu and Izolda Fotiyeva, who teach early childhood mathematics education courses and will contribute with Dr. Hughes to the project. They will test the curriculum and VITAL environment at Howard University in Spring 2008. A full list of our partners, their institutions, and areas of expertise can be found on page E in the appendix.

Project Management

Discoveries in the first two years of the grant period have led us to expand our staffing in order to accommodate new requirements we have added to our project plans.

Faculty partners. As described in the course development section, our investigations of the curricular requirements of other institutions revealed a need to create flexible and adaptive materials. To help us in this area, we enlisted two professors who are teaching related courses to different populations, Dr. Joon Lee of Hunter College (CUNY) and Dr. Ann Cami of Teachers College. They are advising us on the expansion of the original curriculum and its adaptation for undergraduate contexts. We have also revised the position of project Investigator Rochelle Kaplan, who will continue as a project partner, but her role and funding as an Investigator will be shared with our new partners at Hunter College as we develop the course curricula, particularly at the undergraduate level.

Project staff. We have made a number of other key additions to the CCNMTL team since the inception of the grant and are fully staffed, as outlined in the proposal. A new Graduate Assistant contributes to the taping and review of new video content for the digital library, and an additional programmer facilitates the development of the VITAL learning environment. Dr. Ryan Kelsey, Associate Director of Education and Research, replaces Peter Sommer.

Findings:

Given that we are in Year 2 of the grant, we have no significant findings to report. Our plans for conducting the evaluation and assessment activities in Years 3, 4, and 5 are described in the Research and Education Activities section of Fastlane.

Training and Development:

The team recognizes the need for early, substantive, and ongoing training for faculty who will offer VITAL: ECME. We proposed testing the VITAL learning environment at William Paterson University in the Fall 2006 semester, and instead we were able to conduct the test a full year early in the Fall 2005 semester. This test revealed a number of important considerations regarding faculty training and support. The team has currently devoted more than 80 hours to developing hands-on training support and best practices for using the learning environment, and the development of essential faculty support workshops will entail many additional hours. Of primary focus is the development of (1) a Professional Development and Adoption program, (2) a combination of self-study materials (both online and in print), (3) regional and national workshops, and (4) online collaboration with faculty.

Our work on the VITAL: ECME pedagogy and software has led to the development of methods for acclimating faculty to specific pedagogical approaches for teaching the content and using the VITAL learning environment, and to the creation of training materials. We are also constructing a demonstration video showing how to use the environment, which will be available to faculty and students in August 2006. While the specific training materials will be revised with the environment, our current materials provide a sound basis for new users.

Outreach Activities:

In the past year, the team has presented VITAL: ECME in a number of public forums and private meetings for the purpose of introducing faculty who teach early childhood mathematics education, psychology,

and mathematics to our pedagogical approaches and methods. Profs. Moretti, Ginsburg, and Kaplan along with members of the project team have provided demonstrations at eight conferences and in numerous private meetings. We have also received a number of inquiries from faculty and administrators who learn of VITAL: ECME through our Web site and project literature.

Ginsburg, H. P., 'Graduating from University to Preschool: What we want our students to learn through VITAL,' Invited speaker at New Media in Education 2006: A Progress Report Conference, New York, N.Y., January 27, 2006.

Ginsburg, H. P., 'Using Video to Nourish the Teacher's Intermediary Inventive Mind,' Invited speaker at the 36th Annual Conference of the Northeastern Educational Research Association (NERA), Kerhonkson, N.Y., October 21, 2005.

Kaplan, R. G., 'Using Videotape Cases to Develop Teachers' Understanding of Young Children's Mathematical Thinking,' Presentation at NJ Edge, 6th Annual Faculty Best Practices Showcase, Plainsboro, N.J., March 18, 2005.

Moretti, F., Ginsburg, H. P., 'VITAL: Video Interactions for Teaching and Learning,' Poster presentation at the Teacher Professional Continuum Conference, Washington, D.C., June 12-14, 2005.

Preston, M., 'Teaching with Video,' Presentation at Teachers College Summer Pedagogy Institute, New York, N.Y., June 22, 2005.

Preston, M., Campbell, G., Ginsburg, H. P., Sommer, P., Moretti, F., 'Developing New Tools for Video Analysis and Communicating Critical Thinking,' Paper presented at Ed-Media: World Conference on Educational Multimedia, Hypermedia, and Telecommunications, Montreal, Canada, July 2, 2005.

Preston, M. D., Ginsburg, H. P., Jang, S., Eisenband, J. G., Moretti, F., Sommer, P. 'Video Interactions for Teaching and Learning (VITAL): A Learning Environment for Courses in Early Childhood Mathematics Education,' Paper presented at American Educational Research Association, Montreal, Canada, April 14, 2005.

Preston, M., Crook, K., 'VITAL: Early Childhood Mathematics Education,' Presentation at Teachers College Technology Demonstration Day, New York, N.Y., April 18, 2005.

Journal Publications:

Moretti, F., "Digital Media in a New Age of Learning and Research: The Multimedia Study Environment Version of The Autobiography of Malcolm X", *Souls: A Critical Journal of Black Politics, Culture & Society, Columbia University, New York, NY*, vol. 7, (2005), p. 1. Published

Book(s) of other one-time publications(s):

Ginsburg, H. P., Jang, S., Preston, M., Appel, A., & VanEsselstyn, D., "Learning to Think about Early Childhood Mathematics Education: A course." , bibl. Boston, MA: Houghton Mifflin., (2004). *Book Published*

of Collection: C. Greenes & J. Tsankova, "Challenging Young Children Mathematically"

Moretti, F., Pinto, L., Kelsey, R., Sosulski, K., "What We Have Learned and How We Have Learned It. Examples of Best Practices of New Media Services and Development Centers in Higher Education." , bibl. Baltmannsweiler: Schneider, (2005). *Book Accepted*

of Collection: B. Lehmann & E. Bloh, "Bd. 3: Referenzmodelle und Praxisbeispiele"

Moretti, F., "Support in the Use of New Media." , bibl. London, England: Facet Publishing, (2005).

Book Published

of Collection: M. Melling, "Supporting E-Learning: A Guide for Library and Information Managers"

Other Specific Products:

Internet Dissemination:

<http://ccnmtl.columbia.edu/vital/nsf/>

In order to meet the demand from outside groups for information about the project, we constructed a public Web site that explains our goals and plans for reaching them, at

<http://ccnmtl.columbia.edu/vital/nsf/>.

Contributions:

Contributions within Discipline:

Our partners at Hunter are keenly interested in using the VITAL pedagogy and learning environment to teach not only early childhood mathematics education courses but also courses in childhood development, children with special needs, early childhood literacy education, and early childhood science education. The interest of using the VITAL approach in these and other courses confirms to us VITAL's applicability and practicality across disciplines, institutions, and educational levels.

Contributions to Other Disciplines:

We are pleased with the expansion of the VITAL technology to other courses and disciplines at Columbia. The technology has been recontextualized for other programs and courses such as the Clinical Psychology program in the School of Social Work, and the Scientific Inquiry and Decision Making course in the School of Dentistry, among others. The faculty in these disciplines have benefited from the pedagogical offerings provided by the VITAL learning environment's features and have voiced their strong support of using the VITAL pedagogical approach and environment for future courses in these and other areas.

Special Requirements for Annual Project Report:

Categories for which nothing is reported:

Products: Other Specific Product

Contributions to Education and Human Resources

Contributions to Resources for Research and Education

Contributions Beyond Science and Engineering

Special Reporting Requirements

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