

Setting the Stage for Reflective Practice: Multimedia Case Study Development

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Abstract: A multidisciplinary team of college faculty and professional educators are collaborating on a four-year National Science Foundation project to develop multimedia case studies to help teachers address the needs of all students, including students with disabilities, within a standards-based mathematics curriculum. Now in the second year of the project, *Mathematics for All* collaborators are finalizing five video case studies. This qualitative study of the project, based on observations, interviews, surveys, meeting notes and reflections from the college faculty, reveal that the process of working together to create the multimedia case studies has influenced college faculty thinking in at least three important ways: 1) media are newly seen as an artifact of learning in higher education classrooms 2) faculty members are connected in new ways to the learning process in elementary classrooms and 3) the collaboration has created new content and pedagogical content knowledge for special education and mathematics educators.

Introduction

An ostensible goal for most pre-service and in-service programs in schools of education is to engage faculty and students of teaching in reflective practice around issues central to the teaching and learning process. Although the goal is worthy, it is a challenge to create curriculum that systemically provides reflection opportunities for students of teaching. Multimedia case studies have been shown to provide pre-service teachers with opportunities to share a common experience and then to reflect on that experience, enabling students to move beyond book knowledge to develop the more sophisticated *conditional* knowledge that plays such an important role in the teaching process. In other words, students need to go beyond reading about teaching strategies. They need opportunities to see them in action. They also need to learn how to select appropriate strategies by reflecting on what factors influence the selection and adaptation of particular approaches (Reinking, Mealey et al. 1992).

Bank Street College of Education and the Center for Children and Technology (CCT) of the Educational Development Center (EDC) are collaborating on a four year National Science Foundation (NSF) project to develop multimedia case studies to help teachers learn about inclusion teaching in the elementary mathematics classroom. The objective is to develop a set of rich case-based learning experiences for education faculty and professional development trainers – a common frame of reference which can be the focal point for creating a reflective environment for pre-service and in-service teachers. The development team, comprised of faculty and staff from Bank Street College and the Center for Children and Technology, is designing the case studies, taping lessons in classrooms in the Northeast, editing the tapes, developing related material, and then piloting the five case studies.

The Center for Technology & School Change at Teachers College, Columbia University is the evaluator for the project. The evaluation for the first year of the project was focused on formative issues -- understanding the process of developing the video case studies, and in particular, discerning faculty perspectives and insights regarding the development of the case studies. The development team and the evaluators are working together to reflect on the process of designing and refining video case studies in ways that thoughtfully engage pre-service and in-service teachers. Later research will report on the impact of the case study on students of teaching. The research presented here captures findings from faculty collaboratively engaged in a unique developmental process.

The Mathematics for All Project

The overall project goal is to develop case-based professional development materials to better prepare K-6 and special education teachers to support individual students and to include students with disabilities, within a standards-based mathematics curriculum. Specifically, the project attempts to: help viewers look closely at the student learning in the classroom to better understand all student needs; to create an understanding of the demands of the mathematical task, to demonstrate various instructional strategies to engage special needs children in mainstream classrooms; and to create awareness of different approaches to the teaching of mathematics.

The project is now in its second year and five case studies are in various stages of the production process. Each case study module consists of multi-media case studies focused on teaching students with disabilities in mathematics classrooms. Each of the five studies has three to four hours of video, each is focused on one of five National Council of Teachers of Mathematics standards and each video segment highlights a particular student with particular learning disabilities. The modules include conversations with the classroom teacher, both as the teachers plan their work and as they reflect with facilitators after the class session.

To define and develop each case study, the overall development group breaks into smaller multidisciplinary teams around particular interests of team members. There is an attempt to balance the teams to include some combination of members who bring expertise in mathematics education and special education or inclusion. The development team meets as a whole group once a month to address and reflect on some of the many tasks involved in the production process: identifying classrooms, interviewing teachers, planning the productions, debriefing taping sessions, and discussing other relevant material to include in the professional development materials which will accompany the video segments.

To date, faculty members from Bank Street, working with CCT staff have fully developed several video tapes and some learning scenarios which will form the heart of the planned multimedia case studies. The development team is now piloting prototypes of these case materials in several pre-service and in-service teacher education courses at Bank Street College of Education. In the midst of this process, faculty members on the development team are wrestling with key concepts related to the creation of meaningful learning opportunities for teachers and students of teaching that will answer the following questions: How do we keep viewers focused on student learning? How do we help viewers understand the various demands of the mathematics task, and How do we help teachers see the subject “the way their students see it in order to transform that vision to benefit their students” (Barnett 1999)?

Background

Putnam & Borko (2000) have written about the importance of situating the learning of teachers in the world of the classroom as a means of creating a rich environment for discourse about practice. They further assert that case-based learning provides specific benefits: the opportunity to step back from the crush of the classroom experience; the ability to provide a group of teachers with one common experience which can be explored from multiple perspectives; and the ability to provide a robust multimedia learning environment that can be explored in nonlinear ways.

Kinzer and Risko (1998) note that traditional classrooms for students of teaching typically involve transmission delivery systems. They recommend, instead, that teachers need to interact with contextualized information in ways that emphasize analyzing the variables in a teaching context. This in turn can help them develop conditional knowledge which is so important to being able to make appropriate decisions based on specific needs of the children in a particular time and place (Reinking, Mealey et al. 1992). By providing a real-world context for students of teaching, case-study advocates argue that they can address a learning need identified in the pre-service literature: to link instructional strategies to specific classroom factors that might affect teaching and to help beginning teachers analyze their decisions in light of specific teaching situations (Reinking, Mealey et al. 1992).

Thus, Mathematics for All is based on the belief that the case study method is an ideal strategy for teachers to explore the complexities of teaching and learning that exist in mixed-ability classrooms, and to anchor this learning in discipline-specific learning contexts. Project developers have noted that multimedia technology can significantly enhance a case-based approach to teacher preparation in at least five ways; it can: 1) broaden images of practice; 2)

provide a shared focus for developing shared language and understanding among teachers, 3) communicate the complexity of the classroom, including nuances and emotions, that are difficult to communicate in textbooks; 4) provide flexible and efficient access to materials, allowing exposure to deeper analyses and different perspectives; and 5) model use of multimedia for teachers.

There is an emerging, but extensive literature on the effects of multi-media case-based artifacts for teachers, as indicated above. This study however, considers the impact on the individuals who are *developing the cases*, as professors and other professional educators design and develop these resources for others. We present evidence that the process of *developing* and piloting case materials can be a powerful learning experience for teacher preparation faculty and other professional educators, leading them to think in new ways about inclusion issues and mathematics learning.

Methodology

Project Personnel

This study is based on data gathered from the primary individuals from the college and the educational organization working on this project: three mathematics educators, a special education professor, a technology professor, and a media specialist. The professors are experienced educators who are well-respected in their fields. The college is a graduate school of education with a collegial and collaborative culture. The college's orientation to education emphasizes a student-centered approach to learning and teaches education students the art of looking closely at the students in their classrooms. Historically, the faculty has been involved extensively in the work of urban schools, and professors are respected for understanding the real, everyday classroom challenges facing teachers.

Data Collection

The research approach used in this study is primarily qualitative in nature and includes interviews, surveys, reflection papers, meeting notes, and observations. The evaluators attended and took notes on all project meetings, regularly interviewed faculty, surveyed both pre-service students and in-service teachers who are piloting the multimedia cases, interviewed students in both pre-service classes and in-service professional development environments, reviewed course syllabi, and read reflection papers written by faculty at the college each year.

Data Analysis

Over the last year and a half, the data have been collected, analyzed, summarized and interpreted in order to identify common patterns and themes related to changes in the development team that were either observed or expressed in the reflection papers, interviews and project reports. The data were collected and analyzed concurrently, to enable the evaluators to provide formative feedback on the development of the case studies and compare emerging patterns with ongoing activities and observations.

Findings

The data that emerged from the qualitative research revealed that the process of developing the multimedia case studies was influencing team members in various ways. Over the last year, three primary themes emerged from data gathered from those at the college most closely involved in the project -- the development team members who were involved in helping to create the case studies. In various ways team members explained that: 1) they were seeing multimedia in a new way, as an artifact of learning in their higher education classrooms; 2) they were connecting in new ways to the learning process in elementary classrooms; and 3) the collaboration was creating new content and pedagogical content knowledge for special education and mathematics educators.

Below we present evidence that the process of working collaboratively to create meaningful learning opportunities for others has resulted in new insights regarding the role of media, the teaching of mathematics, inclusion teaching, and teaching and learning more generally, for those involved in the project.

Media as an Artifact of Learning for Faculty

First, the data suggest that the process of developing and piloting the material has helped faculty appreciate the importance of media as an artifact of learning. Although the faculty members involved in the project are sophisticated technology users, developing the multimedia case studies provided them with new insights into using multimedia as an artifact of learning. They became more aware of the agency – the power – of the media. Exploring various uses of the video as the case studies evolved helped these developers begin to think differently about what could be done in their classrooms and what how the media could truly become an “object to think with.”

For instance, one faculty member explained that by investing more time in pre-planning for the video production. “I was able to focus more and watch the learning unfold without being distracted by all the other influences around my focus child” (Education Faculty Reflection, 2003). Another explained that improved technology (i.e., individual microphones for each child) enabled him to understand more effectively the intentions of the student he was trying to capture on video (Education Faculty Interview, 2004).

Other faculty members commented on the enriched media learning environment they that they could now provide their students of teaching. According to one, the tapes helped the students focus on “understanding the purpose embedded in the math challenge” (Education Faculty Reflection, 2003). Faculty members also described their students’ pleasure in being able to view and re-view the tapes and compare their varied responses. “It was, from my perspective as well as theirs, a very stimulating learning experience with very concrete and specific data to observe and discuss in relation to the theory and experiences they were integrating” (Education Faculty Interview, 2004). Other faculty members made these comments:

Graduate students want more opportunities to watch children doing math and this format is well suited to provide that. They learned to observe carefully through a screen for math observation. They learned how critical it is to know the math before they could assess any child’s actual work. This deeper understanding of the “task” is brought home in this work we are developing. The focus is then on ‘what does the child do?’ and ‘where is the evidence?’ They learned that doing math is not just about content but also about the process of moving through problem to completion and that also includes the challenges of working with others to accomplish that end. (Education Faculty Interview, 2004).

“Using the case material over two [class] sessions allowed for visiting and re-visiting the material, a very useful aspect to the video case study. The intense focus on [the case study student’s] efforts to complete the task proved very important in heightening the student’s depth of inquiry and efforts to analyze the task (Special Education Faculty Reflection, 2004).

As another faculty member explained, the video tapes are “objects to think with” (Education Faculty Interview, 2004). Also, “I learned that cases can bring the real world of teaching closer to the mind of the new pre-service teacher and that the in-service teacher also can benefit by watching other teachers and children in action, learning math” (Education Faculty Reflection, 2003).

Faculty used the videos for a variety of learning purposes, but most commented on what the tapes enabled them to do in new ways. “In the limited way that I used the video clip we produced, I learned about what I still need to do to help my students develop note taking techniques for research. The video was a vehicle through which I could help them begin to think about the necessity of taking objective notes in a classroom setting (Education Faculty Interview, 2003). Thus, although artifacts are typically something created for a practical purpose, the faculty found that there was also power – and value – in the creative process itself.

New Connections to Classroom Learning

A second finding is that the classroom taping appeared to connect faculty to elementary classroom learning in new ways -- ways that transcended even the close association with classroom learning already enjoyed by this group of professionals. In the words of one professor, the process of putting together the video tapes “Stretch me as a competent professional math educator” by asking faculty to “deconstruct what we have taped and what we know is the teacher’s intent and what the teacher hopes for the child and for the lesson” (Mathematics Education Faculty Reflection, 2003).

This connection to the classroom also affirms an important value and perspective for the college faculty: “Watching the video allows us to work backwards from practice to determine what teachers need to know. The study of practice is important because it respects the central importance of the classroom in our attempts to improve education. No attempt to improve education can succeed unless it affects the quality of teaching and learning inside the classroom; the classroom is like a bottleneck, through which all reforms must pass (Education Faculty Reflection, 2003).

Another faculty member explained, “This project, especially the close filming of individual children, keeps me close to the client – the child. I am fascinated by the way children learn math and intrigued by the interaction between learners. I am fascinated by the ‘moves’ of a teacher in the service of helping children along a learning trajectory. This project continues to keep me closely connected to students. And due to the ‘special’ nature of the kids we choose to watch (e.g., Michael who is autistic), this project work keeps me forever humble. (Education Faculty Reflection, 2004).

Thus, although the faculty involved in the case study development have historically enjoyed a close relationship with teachers and students in the metropolitan area, the process of creating the case studies connected them to the classroom in new ways. Faculty now had the ability to deconstruct activities and influences in the classroom more closely and thus become more deeply engaged in the particulars of learning process.

New Pedagogical and Pedagogical Content Knowledge

A third finding is that the math faculty and special education faculty both gained substantively from collaborative discussions about math and inclusion classroom practices. The cross-disciplinary collaboration within project teams and within the case development team as a whole has provided opportunities for faculty to share ideas and strategies from their respective areas of expertise. Members routinely spend project team meetings weighing various pedagogical approaches captured in the tapes, and discussing what math tools should accompany the case studies, and how to approach the special needs of children shown in the video footage. These deliberations have led, in turn, to new insights about addressing the special needs of children and new perspectives on teaching math.

“This year the project has grown in its meaning for me -- grown in breadth and depth of awareness and understanding of the process of developing the cases, the specificity of the content, mathematical and pedagogical, and the complexity of the multiple uses that the material can be used for. It has also been very meaningful to see a range of students and participants react favorably, in differing ways, to the case material” (Faculty Reflection 2004).

Focusing on inclusion for math educators brought new awareness of special education concerns. In one interview, a math educator explained that he had spent more time thinking about what he was trying to do for special education children in mathematics. Although he is not a special educator, he has always been interested in special needs children but he is now aware that there are often many special needs among the students in mainstream classrooms (Math Education Faculty Interview, 2004).

The study of inclusion has also introduced other new perspectives: “Before I thought that special needs work should come well after the issues of so-called ‘regular ed’ math teaching are well established in the minds of the students. I have a different view now because I see the power of asking our teachers to step into the struggle of helping the child who has difficulty understanding” (Math Education Faculty Reflection, 2003).

At the same time, special education faculty members have also been exposed to discussions of math pedagogy that they would not been privy to without the interdisciplinary project. “As a non-math member of the team, I have found it instructive to work so closely with the math team members and to see the ways in which my understanding of math, as well as of the challenges in teaching math, have grown” (Special Education Faculty Reflection, 2004).

Overall, the extensive focus on math and inclusion teaching and learning has provided a valuable reflective environment for the development team. Team members have used the tapes to look more deeply into their own practice -- their own beliefs about it and use of materials to accomplish particular pedagogical goals. “The video interview led to a rich discussion of the details that go into knowing a child’s learning strengths and weaknesses,

understanding the varied demands of a particular math lesson and making the match between the two” (Special Education Faculty Reflection, 2004).

Conclusions

The Mathematics for All developmental team succeeded in creating a thoughtful learning community this year around the topics of inclusion and the teaching of elementary mathematics. The task of creating video case studies provided a clear focus that allowed the team to concentrate on meaningful issues that in turn influenced the thinking of the team members as they went about the process of developing the case study material.

“I am learning every bit as much as my adult students are learning, and maybe more as we all take the extensive professional time to deconstruct what we have taped and what we know is the teacher’s intent and what the teacher hopes for the child and for the lesson” (Math Education Faculty Reflection, 2004).

Although the intent of the National Science Foundation is to create case studies about mathematics inclusion for in-service and pre-service teachers, the thoughtful work being done around the development of the case studies has the added effect of developing a circle of learning within the development team. It appears that case studies can serve a powerful developmental purpose, as well as to create a product to impact students of teaching.

This research demonstrates that case studies can be catalysts for end-users, but the creation of case studies can also be a catalytic experience for the developers. As one faculty member explained, “Cases are *starting points* for conversations about the accommodations that should be made in the teaching of math to special needs children” (emphasis added). More opportunities are needed for faculty to engage in thoughtful reflection around practice. The study summarized here demonstrates the importance of paying attention to the creative process as more conversations are created and more learning communities are directed at improving teaching and learning in the elementary classroom.

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