STAGES OF DEVELOPING TEACHER VIDEOCASES FOR LEARNING TECHNOLOGY INTEGRATION: "TECHNOLOGY INTEGRATION INTO MATHEMATICS EDUCATION" PROJECT

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ÖZET: Öğretim olayı karmaşık bir süreçtir ve araştırmalar öğretmenlerin teknolojiyi öğretimlerine entegre etme hususunda kendilerini hazır hissetmediğini göstermektedir. Teknoloji entegrasyonunun karmaşık gözükmesi ve öğretmenlerin kendi sınıflarında teknoloji kullanmalarındaki sıkıntıları yeni stratejilerin doğmasına yol açmıştır. Bu anlamda eğitimde karmaşık bilgi ve problem çözme yolu olarak örnek olay metodu öğretmen eğitiminde teori ve pratik arasında köprü kurulması amacıyla güçlü bir çözüm aracı olarak karşımıza çıkmaktadır. Yeni bir bilimsel yaklaşım ve örnek olayların dijital platforma taşınması biçimi olan video örnek olaylar günümüz eğitim araştırmalarında ve özellikle öğretmenlerin teknoloji bilgi ve yeterliklerini artırmak amacıyla sıklıkla kullanılmaya başlanmıştır. Video örnek olayların geliştirilme süreci güçlü ve tekrar edilebilir boyutlarda olmasına rağmen zor ve karmaşık bir iştir. Bu makalede Türkiye'de matematik öğretimi boyutunda ilköğretim öğretmenlerinin hazırlık sürecinde ve çalışmakta olan ilköğretim öğretmenlerinin eğitiminde kullanılmak üzere "matematik öğretim uygulamaları" projesinin video örnek olay veri bankası gelişim aşamaları anlatılacak ve bu projenin dijital ortam elemanları tanıtılacaktır.

Anahtar sözcükler: Video örnek olay, teknoloji entegrasyonu, multimedya video örnek olaylar, matematikte video örnek olaylar, TME2

ABSTRACT:Teaching is a complex process and research show that teachers do not feel prepared to properly integrate technology into their instruction. Because technology integration seems complex and teachers find difficult to use it in their classes, some new strategies have been emerged. Case methodology has emerged as a powerful solution tool for creating a bridge between theory and practice in teacher education by developing complex knowledge and problem-solving skills in education. Videocases, as a new scientific approach and transformations of cases to digital forms, have been increasingly used in today's educational research areas particularly to support teachers with the opportunity to develop technology knowledge and skills. Although the process of developing the videocases has evolved to be robust and replicable, it is difficult and complex. This paper describes the stages of developing the "teaching mathematics practices" videocase database and describe the components of its digital platform for use in preservice elementary teacher preparation as well as inservice elementary teacher training in respect to mathematics education in Turkey.

Keywords: Videocase; technology integration into mathematics; multimedia videocases; videocases in mathematics; TME2

1. OVERVIEW AND PERSPECTIVE

Research show that teachers do not have the necessary training and experience in using technology during their pre-service education. Even those who have received professional development in pre-service years do not feel fully comfortable to properly integrate technology into their instruction (Morsund & Bielefeldt, 1999, Strudler & Wetzel, 1999; Ponsessa, 1996; Loveless, 1996; Topp, Mortensen & Grandgenett, 1995).National Center for Education Statistics in USA (2002) report that only 27% of in-service teachers feel well enough prepared to integrate educational technology into their courses (http://nces.ed.gov/).

Several reports refer to equipment, software, time, and training as the most common barriers to the integration of technology (Hall, 1997). In respect to resources, ministry of Education in Turkey (MEB) report that 59% of K-12 schools and 93% of K-12 school students have access to network resources (http://www.meb.gov.tr/ADSL/adsl_index.html). As can be seen from the numbers provided by MEB it is clear that these students must have access to and use technology.

Because technology integration seems complex and teachers find difficult to use it in their classes, some new strategies have been emerged. One solution to developing complex knowledge and problem-solving skills in education and other professions has been the use of cases (Hayek & Tanase, 2002; Jonassen & Hernandez-Serrano, 2002; Stepich, Ertmer & Lane, 2001; Ball &

Lampert, 1998) because it fosters knowledge representations in multiple-context dependent settings (Albion&Gibson, 2000; Merseth, 1996).

Case studies have been used to develop complex knowledge and problem-solving skills in education and were often presented in text form in the past. Videocases, as a new scientific approach and transformations of cases to digital forms, have been increasingly used in today's educational research areas particularly to support teachers with the opportunity to develop technology knowledge and skills. When comparing print and video-based cases it is clear that video has the potential to provide a relatively unfiltered representation of practice. When video cases are used for training purposes, such as teacher education, they may not only convey more information than text cases, but they may also be a more accurate representation of reality (Beitzel& Derry, 2004; Kinzer, 1997; J. J. Gibson,1979).

Teachers must be well-prepared to use these tools to be able to have necessary complex skills necessary in today's education. Today, digital video is more widely used in educational practice and research areas than ever before. Nevertheless it is still quite new to researchers and instructional designers, and useful design parameters have not yet been developed and published for the field. Although the process of developing the videocases is difficult and complex, it must be robust and replicable, (Oksuz, Savenye, & Middleton, 2003; Li et al., 2003). If the design function proves to be robust (i.e., the media, content, and resources are robust) a case can be transported to methods courses and professional development experiences in education (Oksuz et. al., 2004). Thus, those considering the prospect of developing cases, or planning to use cases in teacher education may desire to hear some stories from the experiences of the avante garde developers, and also gain some initial experiences in developing video. The fascinating possibilities that this new high technology provides may encourage more people to incorporate video technology into their work and research.

The National Council of Teachers in Mathematics' Standards states, "Technology is essential in teaching and learning mathematics; it influences the mathematics that is taught and enhances students' learning" (NCTM, 2000). Teachers must be well-prepared to use technological tools to be able to have necessary complex skills necessary in today's education.

Case-based videos have been used to help teachers gain skills and knowledge in the application of technology and in mathematics pedagogy (Ball & Lampert, 1998; Hayek & Tanase, 2002; Olkun, Altun ve Deryakulu, 2006) and get opportunities to observe and interact with teaching and learning situations (Savenye et al., 2003). Thus, case-based studies should be an essential component of practice-oriented teacher education programmes.

3. INTRODUCTION TO THE TECHNOLOGY INTEGRATION INTO MATHEMATICS EDUCATION PROJECT

Similar to the "Preparing Tomorrow's Teachers to Use Technology (PT3) grants" in USA, to improve teacher preparation programs in respect to allow educators to more effectively integrate technology into their mathematics teaching, the Technology Integration Into Mathematics Education (TME2) program at Adnan Menderes University (ADU) was awarded a 3- year, $120 000 implemention grant by the Scientific and Technological Research Council of Turkey (TUBITAK). This Project involves a collaboration among schools and ADU to provide preservice and inservice teachers with access to a rich videocase database of mathematical instructional materials and also methods for utilizing these materials. Preservice and inservice teachers will be expected to access these rich videocase database via WWW, get ideas of how to integrate technology into education in innovative ways and integrate these materials into their instructions.

The primary goal of this project is to develop a database of "best mathematics practices" videocases related to technology integration into mathematics instruction in elementary grades and use these videocases in preservice and inservice teacher education and training practices.

To achieve the project's goals, the following activities are considered: Selecting teachers to be participated in this project; giving training and workshops to selected teachers with regard to the integration of technology into their teaching and learning activities; developing lesson plans

through a partnership among project personnel, researchers and teachers; selected teachers' presentation of these lesson plans in their own classes; videorecording these class practices along with teacher prerinterviews and postinterviews; gathering expert (Method expert, field expert and technology expert) comments regarding these practices; documenting teacher's own reflection for his/her own practice; and finally, using these videocases in preservice and inservice teacher education as well as delivering them via internet to provide access to all educators.

The purpose of this paper is to discuss the stages of developing the "teaching mathematics practices" videocase database and describe the components of its digital platform. In this paper we will explain some aspects of the video production of videocases in TME2 project that might be useful for beginners in this process.

3.1.Developing a Videocase

One of the disadvantages of producing a video is that it is a time-consuming process. Depending on your research question, purpose or target audience, developing a videocase may take many hours and typically is a team effort. There are generally three stages in videocase development: pre-production, production and post-production.

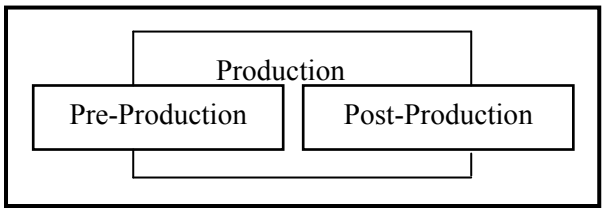

Figure 1. Three Stages of Videocase Development Process

In this process the project team, on the one hand, serve as theory builders and managers of subsequent stages. On the other hand, it involves three other specialties: 1) Teacher selection, liaison and materials for pre-production; 2) A videographing for production, case documentation, editing and markup and 3) Web design and building the searchable database for post-production.

In the pre-production stage, the team is mainly responsible for identifying the "best" teachers ("best" referring to a match to the goals of our project, not any objective criterion), managing all schedules and forms for the teacher videographers. Finally, they interview the teachers to document their plans, goals, and design for the class being videotaped. Interview part is especially important in this project because it allows teachers to share their common experiences of practice that would otherwise be difficult to understand by novices. As Weick (1995) noted if people want to share meaning, then they need to talk about their shared experience in close proximity to its occurrence (Weick, 1995, p. 188). General overview of the procedures in Pre-Production Stage is illustrated below in Figure 2.

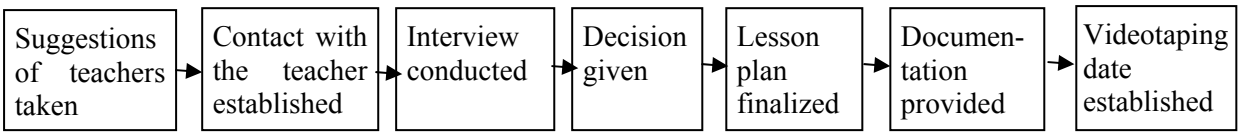

Figure 2. General Overview Procedures in Pre-Production Stage of TME2 Project

To find teachers to participate the project, we receive suggesstions from variety of sources such as teacher candidates who complete their practicum experiences, principals, teachers and professors and establish a pool. Based on the lesson we developed we get a contact with one of the teachers. During the initial interview, we basically try to understand the teacher's philosophy of teaching and learning. Moreover we discuss the lesson plan, lesson materials, and expected dates for the videotaping. Then as a team we decide whether to videotape the teacher or not. If we decide to include the teacher in the project and if the teacher accepted to participate we provide him/her our documents folder (see the documentation below). Videotaping is set for that date.

In the production stage the videography team is mainly in charge and primarily responsible for technical aspects of this process. Some of its responsibilities involve doing some pre-production works, taking care of the equipment, setting up the equipment for shooting, videotaping the interviews, videotaping the class, transferring videos into media suitable for editing, editing rough videos, and transferring the edited videos to the development computer. This team also edits videos on computer and makes movie videos, then compress video and provide the final product to the web team. The procedures in production stage is illustrated below in Figure 3.

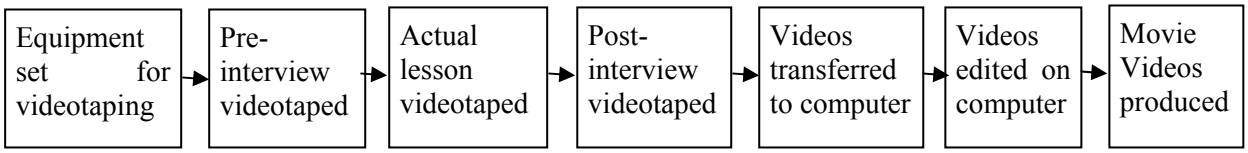

Figure 3. General Overview Procedures in Production Stage of TME2 Project

In brief, after having videotapes, we go through some sub-steps in this production period to insure that no important work is missed. These steps are as follow; making mini-DV backup copies, forming an editing plan, transferring video clips into computer, editing videos, cross-checking by other member(s) of the team, compressing videos, conducting the final check, providing the final video to the web team.

The web team is mainly responsible for putting all the videos and all other information provided by the other teams on the web server, developing the videocase database, and updating and keeping the server running.

Figure 4. General View of Videocase Database of TME2 Project

Basically the project team lead the design and often have firsthand responsibility to ensure whether the design is constructed in the right direction to reach its goals (theoretical issues) on the one hand, on the other hand it has first responsibility in production of a design as product (pragmatic issues).

3.1.1. The documentation

Participants require to fill out some forms to complete the case. The first one is *Adult Consent Form* that should be filled out by the teacher and any other adult in the classroom during the videotaping session (computer (formator) teacher,etc.). A *Teacher Biographyform* is also supplied to have a brief idea of the background and philosophy of the teacher. The *Lesson Plan* is

supplied by the Project team so that the teacher may make some adaptations and also other teachers observing the videocase through the database may have a chance to integrate the lesson into their classrooms. Along with the adult forms a *Parental Permission Form* for students is required. Every student videotaped must have a permission slip. If students forget to turn in a permission slip, or if their parents do not want their kids' participation, they are usually placed behind the cameras so the cameras do not capture them.

The required forms are given to the teacher as a folder. The teachers are requested to fill out the forms in Word and get them back to the project team. Those information transferred the computer by Project personel.

Two other forms are provided in the folder. *Tips for Looking Good on Tape* provides the teacher with some suggestions about clothing that works best for videotping. Suggestions include wearing solids and avoiding stripes and repetitive patterns. On this form, there are also suggestions to wear suitable clothes for lavalier microphone attachment.

Teacher and Student Interview Questions are also provided in the packet. Those questions are given beforehand so that they have time to reflect on the questions and prepare for the interview. Teacher pre-interview questions are about; grades, levels, student scores, subject-matter, topic, strengths of the lesson, preview of the lesson, technology and materials used, standards that addressed, teaching methods, and Preparatory work. Teacher post-interview questions are about; Overview of the lesson, unexpected events, next topic, assessment (time of the assessment, format of the assessment, assessment & relationship to standards), advice to other teachers, alternatives, adaptations for special education students. Student interview questions are about; reactions to the lesson, differences on that lesson, likes and dislikes about the lesson videotaped.

All of the forms, especially permission slips are due on the day of videotaping. At this point, most teachers have all of their paperwork completed and ready.

4. IMPLICATIONS

As can be seen above, developing videocases needs careful processes of designing, team effort, and long term planning and is a time consuming process but the results are promising and worthwhile. Some benefits of the videocase database can be counted as it is emergent, contextually-based, and descriptive. Moreover, the logic of implementation is defined in terms of outcomes, and is testable using standard research methods. The videocase design, then, works as a solution to the problem of 'technology integration into education', and also works as a tool, which is subjected to, as Bannan-Ritland et al. (2003) suggested, testing, modification, re-testing, re-design. If the design function proves to be robust (i.e., the media, content, and resources are robust) a case can be transported to methods courses and professional development experiences broadly in mathematics education. Some end-users might modify the design to fit local needs e.g., to offer preservice or inservice teachers glimpses of classroom management, inquiry practices, discipline issues, cooperative learning or examples in the field of special education, educational psychology and so on. Moreover, the stages of project's development and design parameters can also be used by other developers, practitioners, policy-makers, and researchers as a structure upon which to build their own cases.

Description of the stages that TME2 project passing through has provided readers with a general overview of how to implement a similar project without having to reinvent the process of videocase development of teaching practices. Future focus in this area should be conducting research on the videocases, and effects of digital videocases for inservice and preservice teacher education.

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