

A Hypermedia Video-Case: A New Tool for Teachers' Professional Development¹

Bao, Jiansheng

Department of Mathematics, Soochow University, 1 Shizhi Street, Suzhou,
Jiangsu 215006, China; Email: bao.jiansheng@suda.edu.cn

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The purpose of this paper is to introduce the development of a new Lesson Video-Case Lab (LVCL) program in Suzhou, China. This program involves the creation of several series of hypermedia video-cases on teaching and learning designed to facilitate mathematics teachers' professional development. Each of these video-cases consists of lesson clips, case questions, interviews with experts, comments by peers, responses by students and other related resources. The study has implications pertaining to the use of technology in teacher development, the production of hypermedia video-cases, as well as research on case-based pedagogy and pedagogy in general.

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ZDM Classification: C3 3, C80, D53, U43

MSC2000 Classification: 97C30, 97C40, 97D10, 97U40

1. A NEW TOOL FOR TEACHERS' PROFESSIONAL DEVELOPMENT

There are usually three approaches used in studying a real classroom: a live observation, a video-based analysis and a text-based case study. However, as a teacher education tool, each of these avenues exhibits disadvantages. For example, during a live observation, observers often find it difficult to capture and note every event taking place in the classroom, and this is particularly the case with novice teachers. Additionally, a video lesson is only a copy of a lesson, and usually lacks substantial pedagogical guidance and analysis. Similarly, text-based case studies often fail to capture and communicate the reality of the nuances and immediacy of actual classroom settings, and

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hence misrepresent, the “buzzing confusion” of true classroom life (*e.g.*, Grossman, 1992, p. 228; Koehler & Lehrer, 1998).

More recently, with the development of media and computer technology, a new kind of case has emerged with the potential to expand the traditional text-based cases and linear video observations normally used in teacher development (*e.g.*, STEP Project Group,² see also Siegel, Derry, Kim, Steinkuehler, Street, Canty, Fassnacht, Hewson, Hmelo & Spiro, 2000). A hypermedia video-case is a learning environment which integrates lesson video clips, case questions, interviews with experts, comments by peers, responses by students and other related resources using hypermedia software that links each of these independent elements to one another.

This software enables users to access easily every part of the case and it also provides opportunities to pause the action either to take time to reflect on the content or to revisit a segment instantly so as to better understand how underlying concepts and procedures for problem-solving play out in real-life (see Figure 1).

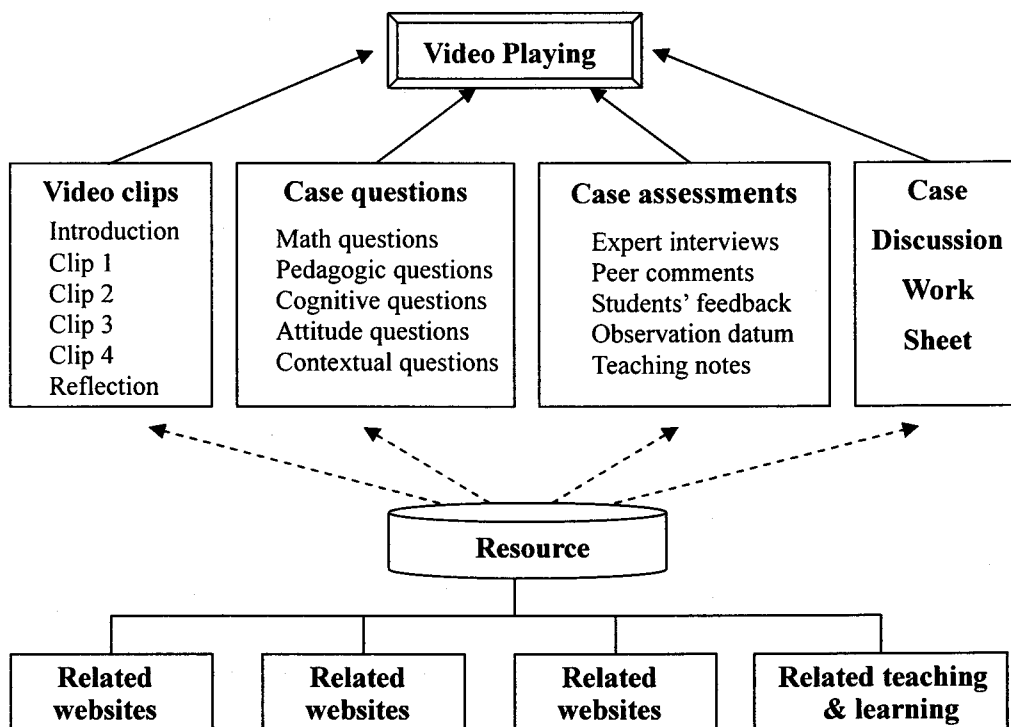


Figure 1. Framework of LVCL video-case

Articles published on hypermedia cases (*e.g.*, Harris, Pinnegar & Teemant, 2003) have

² <http://www.wcer.wisc.edu/estep/>

proposed some advantages of video-cases, such as: authenticity, constructivist learning, and theory application. The authenticity argument suggests that teachers can better relate to content of multimedia cases because these cases provide opportunities for more direct observation of what is going on in the classroom. In providing visual and auditory cues, hypermedia cases help teacher-learners develop pattern recognition skills (Bransford, Franks, Vye & Sherwood, 1989). The moving pictures of video cases allow users to have more autonomy to make out the meaning of what they see and to choose their specific points of attention (Harris, Pinnegar & Teemant, 2003). The moving pictures also give higher face validity, which is the level of realism that people feel when they interact with a case (Richardson, 1999). In other words, the more realistic a case appears to a viewer, the greater its face validity (Kent, Herbert & McNergney, 1995). The visual images may also facilitate memory retention (Clark & Paivio, 1991) expand perspectives, and inspire creativity (Bliss & Mazur, 1996). Bearing in mind the advantages of hypermedia video-cases described above, we decided to establish the Lesson Video-Case Lab (LVCL) to produce a video-case series as a tool for teacher education.

2. COMPONENTS AND FUNCTIONS OF LVCL VIDEO-CASES

The framework of LVCL video-case is described in the following figure:

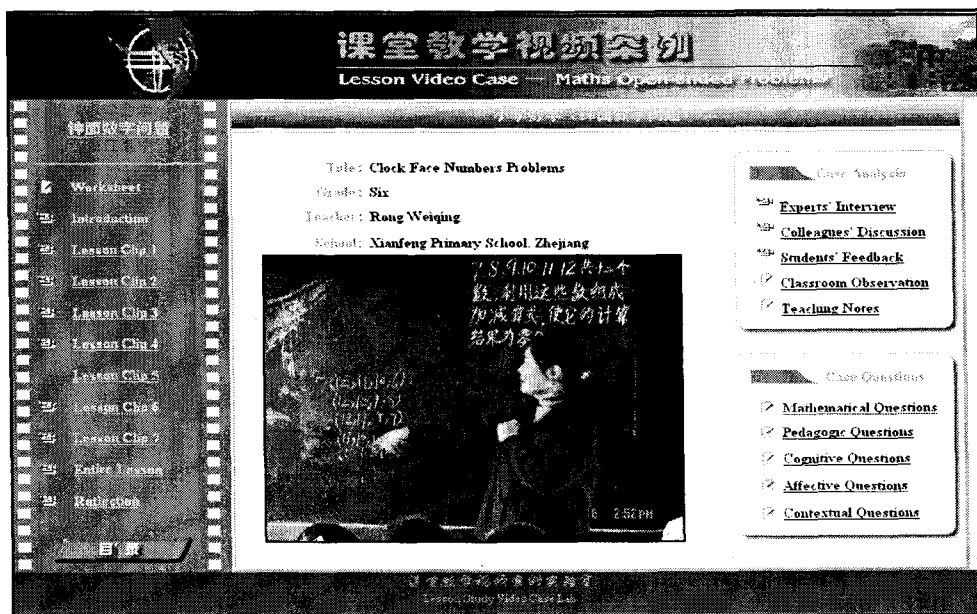


Figure 2. Template of LVCL video-case

From Figure 1 we can see that each video-case comprises two major parts. The upper part is the main body of the case study, which includes a case discussion work sheet, video clips, case questions and case assessments. All of these can be activated by using the linked buttons (Figure 2).

The second part of the video-case is a case resource bank, which includes related websites, theories, research and teaching & learning materials.

The video-cases can be produced either as a CD-ROM, a VCD or they can be published online.

3. PROCEDURE IN VIDEO-CASE STUDY

As a tool for teachers' professional development, the video-case aims to:

- Highlight the most important issues in curriculum reform;
- Describe the stories and dilemmas faced by teachers and learners;
- Bridge learning theories and real classrooms;
- Provide opportunities for teachers to learn from experts;
- Construct a hypermedia environment for discussion and the sharing of teaching ideas;
- Facilitate teachers' reflective thinking on multi- perspectives; and
- Manage teachers' knowledge to help them become researchers.

Table 1. Highlights of a new standards-based curriculum video-case (sample)

Case Title		How high is it?	
Content		Geometrical sequence	
Case highlights	Fundamental Issues	Concepts understanding	
		Basic skills	
		Problem-solving	✓
	Hot Topics	Situated learning	
		Math investigation	✓
		Real-world problems	✓
	Mathematical thinking	Algebraic thinking	✓
		Prove and proof	
		Visual reasoning	
		Data inference	
	Teaching & learning styles	Group work	
		Teaching using variation	✓
		Cross subjects learning	
Technical support		✓	

There are several series of video-cases planned by LVCL, which will include a new standards-based curriculum series, a teaching and learning open-ended problems series and a bilingual mathematics teaching series. Each series has a theoretical framework which supports the most important issues within the project and each video-case will highlight other elements which fit into the overall framework. For example, the following table (Table 1) shows a sample video-case framework for a high school new standards-based curriculum series.

Each video-case is usually developed by the following procedure:

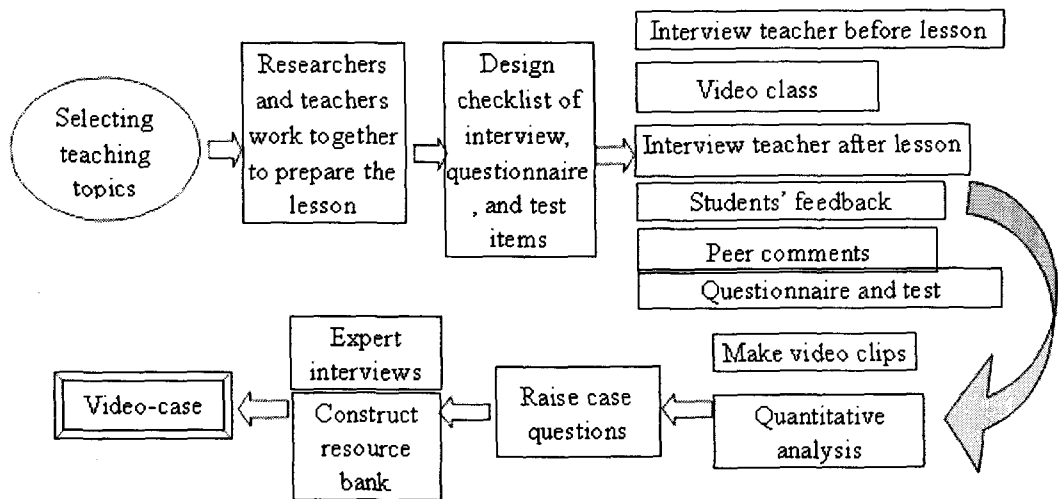


Figure 2. Procedure of video-case study

In fact, the above diagram is not only the procedure undertaken in the video-case study but it also outlines the process of active research taking place when researchers and teachers cooperate on teaching and learning issues.

4. VIDEO-CASE: A PROMISING TOOL FOR TEACHER EDUCATION

Teacher education programs are often charged with being irrelevant, overly theoretical and out of touch with the realities of teaching 'on the front lines' (Bencze, Hewitt & Pedretti, 2001). This theory/practice divide demands radical changes in teacher education, and we suggest the use of the video-case as a solution to this conundrum.

It is now widely believed that case-based learning is an essential component of practice-oriented teacher education programmes. Studying cases is one viable method

which can stimulate cognitive flexibility, because it fosters knowledge representations in multiple-context dependent settings (Albion & Gibson, 2000; Merseeth 1996; Merseeth & Karp, 1996).

Compared with text-cases, video-cases — which are embedded in a hypermedia environment — offer far more opportunities to represent classroom practices and perspectives in an authentic and multifaceted way. The video format itself promotes learning by supporting a viewer's cognitive processing and development with diverse rich mental representations. That is, the spatial and dynamic (moving) quality of video makes scenes richer and more realistic, contributing to the authenticity of what is captured (CTGV, 1990); and, because so much detail can be shown in a visual format, video-cases can better reveal the ambiguity and complexity of classroom events, thus adding to their apparent authenticity. Events and contexts that are seen as authentic are usually encoded easily into memory because they are "believable" to the viewer and can therefore be readily connected to prior knowledge in existing mental representations (Baddeley, 1990).

Research has repeatedly stressed that there are difficulties in trying to promote teacher change because teaching is a complex, ill-structured domain of knowledge that is difficult to convey (Richardson & Placier, 2001). Much of expert-teachers' knowledge is tacit. As Carter (1990) states, "Simply telling novices what experts know will not produce expertise." Bransford *et al.* (1989) reiterates this idea in explaining that, "Wisdom can't be told." Developing this wisdom of classroom practice requires a real-world illustration of abstract concepts (Jacobson & Spiro, 1995). Thus, many believe that hypermedia video-cases give users the opportunity to see theory in action (Harris, Pinnegar & Teemant, 2003).

In conclusion, although there is still a lack of firm evidence proving that cases impact on the thinking and therefore the practice of teachers (Bliss & Mazur, 1996) and a paucity of evidence available on video-cases in general (Harris, Pinnegar & Teemant, 2003), we remain confident that they will be both a useful and a promising tool in future teacher education. Despite our project being only in its infancy and doubts about the degree of effectiveness of hypermedia video cases, our project will provide much-needed research data on the subject.

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