Chapter 12
Using Video as a Retrospective Tool to Understand Self–Regulated Learning in Mathematical Problem Solving

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ABSTRACT

This chapter presents a novel approach that combines self-regulated learning (SRL) with Activity Systems Theory (AST). While SRL focuses primarily on individual cognitive and social aspects, it does not address sociocultural factors that inherently play a role in learning processes. The combination of SRL and AST is effective due to the central role that feedback plays in both theories. The viability of this approach is tested with data collected from Canadian secondary school-level students engaged in mathematical problem solving (MPS) using video as a retrospective feedback tool. Analysis using this theoretical framework based on SRL and AST provides a richer understanding of how video can contribute to learning within technology-enhanced learning environments (TELEs). Based on these findings, suggestions for implementation are provided for educators who would like to effectively use video in classroom situations.

INTRODUCTION

The face of learning is changing substantially. Classroom learning is surrounded by informal learning opportunities with new tools, lectures are complemented with project-based learning, and frontiers between instruction and learning are fading as students collaborate in forming knowledge communities. It is clear that these developments are driven by technological advancements which...
require psychological and pedagogical models of learning that take into account both: (a) the diversity of situations in which learning takes place, and (b) the specific needs of learners, instructors, and school administrators.

Within such contexts, self-regulated learning (SRL) is a useful perspective to draw upon as an important theoretical framework that describes significant aspects of successful learning in terms of individual goals, motivations, volitions, and emotions (Butler & Winne, 1995; Pintrich, 2000a; Winne & Hadwin, 1998; Zimmerman, 2000). Learners employ self-set learning goals and use environmental features to regulate their cognition, motivation, and behaviour. One weakness in this framework lies in its oversight of contemporary educational perspectives that view learning as a sociocultural process involving the individual, as well as peers, educators, and the environment. In order to better reflect current understandings of teaching and learning contexts, this chapter presents a combination of the psychological perspective of SRL and the sociocultural perspective of Activity Systems Theory (AST) so as to provide a more comprehensive understanding of how learning might take place within technology-enhanced learning environments (TELEs).

Following a brief overview of SRL, this chapter provides an explanation of how its omission of sociocultural learning components can be addressed by drawing upon relevant elements from AST. The viability of this new theoretical framework will be illustrated through its application to data collected from an empirical study with Canadian secondary school-level students using video as a retrospective tool in mathematics problem solving (MPS). Based on this study and its findings, a number of implementation guidelines are also provided for educators who are interested in using video to promote SRL in classroom environments.

**BACKGROUND**

The concept of self-regulation is a relatively new area of educational research. Two decades ago, Glaser (1987) characterized self-regulation as an “executive” skill for monitoring problem-solving and other socio-cognitive processes. Early studies suggested that self-regulation skills were important in: (a) helping learners use and transfer their knowledge to new situations, and (b) selecting, combining, and coordinating cognitive resources while carrying out specific learning tasks. Since then, many studies have identified important relationships between motivation and learning, suggesting that self-regulated learners achieve better learning outcomes (Pintrich, 2000a, 2000b; Zimmerman & Martinez-Pons, 1988, 1990). Given the significance of such benefits, researchers have become interested in fostering the abilities of students to become self-regulated learners (Pintrich & Zusho, 2002).

SRL has been defined as “an active, constructive process whereby learners set goals for their learning and attempt to monitor, regulate, and control their cognition, motivation, and behaviour, guided and constrained by their goals and the contextual features in the environment” (Pintrich, 2000a, p. 453). It has also been seen as involving “cognitive, affective, motivational and behavioural components that provide the individual with the capacity to adjust his or her actions and goals to achieve the desired results in light of changing environmental conditions” (Zeidner, Boekaerts, & Pintrich, 2000, p. 751). Reaching a consensus definition remains a challenge, as different models of self-regulation emphasize slightly different aspects of the overall process (Pintrich, 2000a). Corno’s (2001) work has emphasized volitional aspects of self-regulation, Winne’s (1996) approach has focused on cognitive aspects of self-regulation, while McCaslin and Hickey (2001) have highlighted sociocultural aspects of self-regulation. In spite of their differences, nearly
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