CHAPTER 3

Technology and Knowledge: Contributions from Learning Theories

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Introduction

There is a tendency to see learning as a process that operates on the “content” of what is to be learned and that content is seen to be independent of how it is learned. Thus discussions of the nature of technological knowledge centre around philosophical arguments such as how science and technology might differ, or cultural analyses that try to relate knowledge to the nature of technological activity as found in industry and other contexts. These analyses are quite legitimate and important in order to clarify the nature of technological knowledge. However, these approaches tend to see knowledge as an object to be passed around and which will find its way into a learner’s head. This is a legitimate view of how learning relates to knowledge, but it is only one view. It encapsulates a particular view of mind, and thus of the nature of knowledge. Another view, however, sees knowledge as closely related to the context in which it has been learned and used. Individuals who have come to understand ideas in different contexts will have different views of the knowledge they “possess.” This view may still have a focus on the individual mind, but one that sees physical and perhaps even social aspects of knowledge intertwined with understanding.

Contemporary theories of learning contain elements of each of these individual and social views of mind, and each theory has important implications for how we see knowledge and how we structure and support student learning in the technology classroom. In this chapter, I explore the nature of these views of learning, what they have to say
about the nature of knowledge, and how that in turn relates to technological knowledge. With this kind of framework, it is then possible to examine examples of technology classrooms through a different lens than is often the case. Four such examples will be presented here. The first relates to how knowledge learned in one context can be different to that in another, even though some of the underlying ideas are the same. One of the reasons for this is the role of tools in mediating thinking. The second relates to how we might draw on and use knowledge from other parts of the curriculum, and particularly from the science classroom. The third draws on the ideas of knowledge learned in context, and the way experts work, to argue that a qualitative approach to knowledge might be more productive in technology education. The final example explores the implications of social views of learning that give new insights into collaborative activities.

Each of these examples contain some important implications for viewing technology classrooms, and the richness they offer to both their analysis and, more importantly, the kinds of student activities that are planned and supported. The chapter ends with a plea for these kinds of views to inform both research and pedagogy in technology education.

**Contemporary Views of Learning: Two Approaches to Mind**

These views can be characterized at one end of the spectrum as *symbol processing* and at the other as *situated* views of the mind (Bredo, 1994). The symbol-processing view, as the name suggests, sees the mind as a manipulator of symbols. These symbols are learned and stored in memory; when confronted with a problem a person searches the memory for symbols to represent the problem and then manipulates them to solve the problem. This is the usual idea we have of applying the understanding of a concept to a new situation. The symbols are learned, through a knowledge-construction process, that is, learners make meaning from experiences.

The second view of mind is represented by a group of theories stemming from the sociocultural tradition. A common feature of this view of learning is the role of others in creating and sharing meaning. The construction in symbol processing has some social element in the construction process. For example, Piaget focused upon individual internalization of knowledge, but saw a role for peer interaction to produce cognitive conflict that would result in a change in the thinking of the individual, leading to the internalization of a concept or idea. The sociocultural view adds a concern for joint knowledge construction. This