Chapter 11
Re–Valuing Constructed Knowledge: An Agenda for STE(A)M

Damon Cartledge
La Trobe University, Australia

ABSTRACT

In this chapter, two issues are discussed that impact teaching and learning in technical and technology education. The issues are bound together by a concept of constructed knowledge and its inherent value. Knowledge constructed and operationalized in non–academic contexts is not well recognized in universities as having intellectual value. Developing knowledge that may be out of context from discipline homes can be misunderstood as lacking depth, when in fact they are highly complex arrangements of interdisciplinary constructed knowledge. The second issue is about how to conceptualize an educational structure in which this complex inter-disciplinary knowledge can be better recognized across educational divisions and strata. STEM (Science, Technology, Engineering, and Mathematics) is a well-established curriculum model that gives both clear definition/delineation (and cohesive purpose) to the interdependent discipline strands of the constructed knowledge under discussion. The chapter closes with an argument for a STE(A)M model, articulating the inclusion of an additional-alternative component for the Artist, Artisan, Artificer, Alchemist, Architect, and so forth, as a model to access, create, and re-value the construction of knowledge within universities of the 21st century.

CHANGING VALUES

“Head, Hand, Heart” was the school motto of the technical secondary school I attended in a small country town in the Australia of the 1970s. It served as the educational conduit to the world for generations of my family. This school grew generations of technicians, artisans and tradespeople into a world with clear structures, roles and responsibilities for the doers and the thinkers of an arguably less complex life-world than has emerged in the twenty-first century. In 2014 this version of technical education would no longer serve the needs of society, including the aspirations of learners. In the Australian context the increasing complexity of curriculum models has...
Re—Valuing Constructed Knowledge

superseded the role and function of such schools for some time now (Beare, 2001; Caldwell & Spinks, 2008; Teese & Polesel, 2003). However, the modes of knowledge construction and problem solving that were the stock—in—trade of technical schools (Rushbrook & Preston, 2009) are increasingly important to the development and sustainability of knowledge—focused economies (Cartledge, 2011; Cartledge & Watson, 2008; Wheelahan, 2012b).

Therefore, the central purpose of this chapter is to explore a way of considering how technical knowledge could be constructed through a ‘new’ combination of existing curriculum structures. The resulting knowledge from the model would (arguably) be constructed in a way that is adaptable and congruent with knowledge values in the modern university.

In this chapter I will begin with an overview of the context for the educational positioning of technical knowledge. From there, discussion will focus on issues related to making such knowledge more visible and valued in education. Firstly, constructed technical knowledge, developed through experience, has historically had great value and purpose generally, but is not as well regarded as other forms of knowledge (Eraut, 1997; Young, 2008). Eraut’s (1997) definitions of Type A and Type B knowledge provide a conceptual frame to identify constructed technical knowledge as different to, but inclusive of, codified theoretical knowledge. Theoretical knowledge (Type A) is propositional knowledge stored in collections and publications. It is subject to peer review and quality controls and legitimized through its use in examinations and qualifications (Eraut, 1997). Constructed technical knowledge is defined here as consistent with Eraut’s (1997) conception of Type B knowledge, as the knowledge that is brought to practical situations to enable people to think and perform including procedural and process knowledge. The utility of this knowledge is that it uses codified propositional knowledge to construct new meanings through experience and reflection (p.553).

Secondly, despite perceived imbalances of value between theoretical knowledge and everyday knowledge, there are overlaps of tested and robust educational frameworks that give technical knowledge academic presence and overt value – the STEM (Science, Technology, Engineering and Mathematics) agenda in particular. And finally a third area of discussion, based on a conceptual model (see Figure 1), is about how related independent systems (and environments) will enrich the understandings and consequent importance of constructed technical knowledge through becoming more interdependent under STE(A)M. The STE(A)M model, articulates the inclusion of an additional ‘A’ component for the input of the Artist, Artisan, Artificer, Alchemist, Architect and so forth. This concept enables better connections between established educational frameworks, as a key strategy in the liberation and revaluing of the utility of technical knowledge.

TECHNICAL KNOWING AND KNOWLEDGE

Knowledge in the twenty—first—century has been codified and commodified, by taking tacit understandings and making them explicit, visible and (contentiously) quantifiable (Apple, 2012; Marginson, 2006; Smyth, Dow, Hattam, Reid & Shacklock, 2000). Certainly, Wheelahan’s (2012a) notion of everyday knowledge has technical understanding and intuitive practice (via that understanding) seemingly displaced by more esoteric and discipline—focused interpretations, in conceptions of what is valuable knowledge. Wheelahan’s (2012a) commentary gives insight to how the position and consequent value of technical knowledge might be strengthened in tertiary education. The notion of a displacement of technical knowledge is about a reordering of what we view as important to the life worlds we occupy. In a developmental context this may be no different in principle to the changes in orientations about