

## Chapter 19

# Teacher Technology Education for Spatial Learning in Digital Immersive Virtual Environments

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### **ABSTRACT**

*The aim of this research is to deepen how teacher technology education can be designed to enhance spatial education, which is intertwined with digital education. The evolution of technology resources can actually sustain spatial learning. In the last years, the user experience has been improved by open-source, collaborative user-generated, and immersive content of synthetic learning environments. This research analyses which spatial design principles have influenced the virtual worlds of digital immersive virtual learning environments. In 3D virtual learning environments spatial interaction is really developed and may open full accessibility to further studies on digital and spatial education. In the joined field of learning and ICT, the main scope of digital technology knowledge sharing, and re-shaping, is the enhancement of digital skills based on experiences in educational activities and the re-thinking of the nature and the format of educational curriculum to implement more experiences in the digital—and, possibly, spatial—fields.*

“Those who would like to see ICT transform the nature of education are still waiting for the long-promised radical shift.”— Roschelle Means

## INTRODUCTION

Pedagogical information and communication technology (ICT) competence – the teachers’ ability to appropriately use technological tools in related curriculum contexts – is nowadays crucial to support educational change by leveraging ICT as a developmental booster for students’ cognitive systems. Teachers’ knowledge and skills are required according to the learning goals foreseen by different curricula, which may vary from just using technology to enhance students’ learning to the idea of starting up advanced models of ICT integration. The main shift is represented by providing customized and personalized learning for students through technological approaches and, at the same time, setting up communities of learners involved in knowledge building processes to face with real-world problems (Law, 2010).

Teachers’ knowledge, related to technology resources, has been categorized in different kinds (Hinostroza, Labbé, López, 2010) (see Table 1):

- kind *know-what* – which refers to content matter knowledge, pedagogical knowledge and methodologies, knowledge of curriculum, learners’ characteristics, educational contexts, and knowledge of educational purposes;
- nature *what-knowledge* – which can be divided in formal and informal knowledge, respectively gained by university studies and by learning from personal and shared experience;
- level *know-how* – which focuses on teachers’ expertise development in coping with practical situations, skill acquisition in facing up under pressure routine procedures, and competence to plan ahead;
- in practice *how-to* – which means learning to carry on management and support routines, and exchange routines with colleagues.

For each one of these types of knowledge, a specific foreseen technological approach is suggested (Hinostroza, Labbé, López, 2010):

*Table 1. Taxonomy of teachers’ knowledge (Hinostroza, Labbé, López, 2010: 223).*

<i>Kind (know-what)</i>	<i>Nature (what knowledge)</i>	<i>Level (know-how)</i>	<i>Practice (how-to)</i>
Content	Formal vs. Informal	Novice	Management routines
Pedagogical content	Intuitive vs. analytical	Advanced beginner	Support routines
Curriculum		Competent	Exchange routines
Pedagogy		Proficient	
Learners		Expert	
Educational contexts			
Educational aims, purposes, and values			

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