Chapter 26
Virtual Worlds as a Learner Centered Environment for Spatial Reasoning

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ABSTRACT

According to generalized usage of computer technology in modern society, computer usage in learning activities is increasing. Textual and audiovisual learning materials have been developing step by step into more structured material. The ability to clearly understand visual data is an important function of higher achievement in the learning process. Thus, understanding of visual data related to spatial ability through computer-mediated interaction stimulates human spatial ability. The purpose of this chapter is to show the practical usage of virtual worlds for learner-centered educational environments that provide room to improve the learner's higher-order thinking, such as spatial reasoning, via learning by doing. The focus here is on introducing a new concept about the role of the virtual worlds learning environment.

INTRODUCTION

The construct of learning-centered education supports learning environments where learning is viewed as a lifelong process and a natural, developmental process that has value for its own sake. Learning is multidimensional, affecting learners' cognitive, emotional, and physical well-being. Learning should be enjoyable and productive (Reynolds, 2005). Today's classroom learning is focused on activities by which the learner acquires facts, rules, and action sequences (Borich, 2004).

Changing with the times, educational reformers have advocated using computer technology to create more learner-centered, open-ended learning environments where learners are provided with varying amounts of help and support in deciding what they need to learn and the resources

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needed to learn it (CTGV, 1992; Hannafin, 1992; Land & Hannafin, 1996). In this context, many researchers and educators have been using new technological media such as games, simulation, and virtual worlds to facilitate learning in recent years. The virtual world is becoming increasingly important as a tool in education. It has some potential power that can support various problems of educational field.

Virtual world technology is increasingly being recognized as a potential tool for the assessment and advancement of cognitive and functional processes (Foreman et al, 1997; Pugnetti et al., 1995; Rizzo & Buckwalter, 1997). Virtual environments allow for the creation of dynamic stimulus environments, in which all behavioral responses can be recorded. It is their belief that computer-generated interactive simulated environments can be used to assess and rehabilitate cognitive abilities, much like an aircraft simulator test and trains piloting abilities.

Virtual worlds have potential as learning environments because they are a form of play that motivates students through entertainment (Kluge, 2008; Park & Baek, 2009; Taubes, 1994). In addition, virtual worlds don't have competitive activities, but rather an open ended learning environment that includes goals, peer feedback, an interactive interface, a user-centered environment, and realistic consequences. Like this, new interactive technologies with virtual worlds provide opportunities to create learner-centered educational environments that involve students in active problem solving and situation exploring. Technologies in *the* learning process *represent* applications of human knowledge to real world problems. They are tools for supporting human needs. Most knowledge construction during such learning activities requires skills like communication, or resource management (Jung & Park, 2008; Park, 2009).

The purpose of this chapter is to show the practical usage of the virtual world for a learner-centered educational environment that provides opportunities to improve the learner's spatial ability as higher order thinking. Learning by doing improves higher-order thinking, including spatial ability, problem solving, decision making, self-regulated learning, communication skills and knowledge construction.

VIRTUAL WORLD, OPTIMAL ENVIRONMENT FOR LEARNER-CENTERED LEARNING

In recent years, interest in virtual learning has been increasing, because of tremendous advances in information and technology. These will have an important impact on future learning environments, and at the same time they will bring about significant changes to education. Virtual worlds have been developed that suit these arising needs. They promise to be highly useful in the practice of many scholarly works and everyday activities (Laurel, 1986, p. 296). The virtual world can be considered a collaborative learning environment (Shih & Yang, 2008). In particular, three-dimensional virtual worlds attempt to attain "worlds than can be experienced from inside, and manipulated" (Taubes, 1994, p. 70). Virtual worlds thus allow people to enter imitation worlds and act in those worlds as they might act in a similar setting in the real world.

Research into learning in virtual worlds is a relatively young field. However, in recent years it has shown considerable growth, because we are starting to see diverse views on the use of the virtual world to enhance learning (Roussou, 2000; Sanchez et al., 1998). Borich(2004) asserts that today's classroom learning is focused on activities by which the learner acquires facts, rules, and action sequences. The majority of the lessons require outcomes only at the lower levels of cognition: knowledge, comprehension, and application. Constructivist theory moves one step farther than cognitivism in considering that knowledge is constructed by learners themselves