

# Chapter 11

## Problem Solving Processes and Strategies in the Virtual Interactive Student–Oriented Learning Environment

**Junjie Shang**

*Peking University, China*

**Morris Siu Yung Jong**

*The Chinese University of Hong Kong, China*

**Fong Lok Lee**

*The Chinese University of Hong Kong, China*

**Jimmy Ho Man Lee**

*The Chinese University of Hong Kong, China*

### EXECUTIVE SUMMARY

*With the integrated use of quantitative and qualitative research methods, this chapter describes the learners' problem-solving processes and the strategies they used under a pedagogy called Virtual Interactive Student-Oriented Learning Environment (abbreviated as VISOLE). By recording learners' operations in the game, and collecting their game logs (BLOG), summary reports, and interview records, also based on the observations done by the researchers, it is found that the problem solving strategies that learners used in VISOLE primarily included: (1) trial and error, (2) random, (3) purpose-oriented, (4) starting from simple, (5) adventure, (6) comprehensive, (7) focused, (8) index, (9) BUG, (10) entertainment strategies, etc.*

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## INTRODUCTION

Constructionists have been putting forward theories and proposals in different prospects for a long time for education revolution, and in those proposals, a basic theory has been widely adopted: study with high-level thinking and construct knowledge based on problem solving (Zhang, 2000). However, while we have problems every day, what on earth is a problem and what is problem solving? Actually, the definition of “problem” is not complicated, for example, Robertson (2001) stated that, when a person wants to do something but does not know how, that is a problem. As for problem solving, Anderson (1980) regarded it as a cognitive action towards a given goal. In short, when people want to achieve a goal but do not know how, a problem emerges, and the thinking process through which people use comprehensive knowledge and skills to achieve the goal is called problem solving.

Problem solving ability is vital to a person’s learning, working and living experiences, and therefore Hong Kong Curriculum Development Council (2001) listed such ability as one of the nine students’ generic abilities that need to be develop. As for how to develop problem solving ability, many constructionists (e.g., CTGV, 1990) suggest the use of a real or a nearly real task environment for learners to solve problems there so that they can develop their problem solving abilities through solving real problems. The rapid development of online games has brought about new inspiration to educators since games would involve environments with challenges in which players need to consult and integrate all kinds of information in order to solve problems there, so that they can win the games. Therefore, many researchers think that a more attractive learning environment can be created based on games to encourage learners to solve problems more actively on their own initiative in order to improve their problem-solving ability and other advanced abilities (Whitebread, 1997; Wang, Hsiao, & Yu, 2006).

Lee and Lee (2001) proposed a learning model called Virtual Interactive Student-Oriented Learning Environment (VISOLE hereinafter). VISOLE is a learning model that allows students to learn knowledge by themselves in a virtual game-based environment and through interacting with the others. The VISOLE process involves three phases: (1) scaffolding learning phase, in which students were taught the high level knowledge including the topics to be involved and how they are related, and also ways to locate the required knowledge; (2) game based learning phase, in which students role played in the virtual world specially created for this purpose and learn by making decisions; and (3) reviewing and summarizing phase, in which students reviewed and summarized their performances under the guidance of teachers. Although Phase 2 and 3 are defined separately, in actual implementation, they are partly overlapped. Based on the framework of the VISOLE learning model, the Centre developed an educational game titled *Farmtasia* (Figure 1). The game cre-

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