Chapter 8

E-Learning through Gaming: Unfolding Children’s Negotiation Skills

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ABSTRACT

A generic theoretical framework on teaching children to negotiate is presented, founded on Piaget’s child development and Thompson and Hastie’s negotiation theories and validated through an experiment. The framework was implemented as CLIPS knowledge base, the back-end of an Intelligent Tutoring Agent (ITA). Negotiation skills were assessed through an online JAVA implementation of the board game Settlers of Catan (SoC). The CLIPS knowledge base was connected by JCLIPS to SoC. The ITA was thoroughly tested and found to be robust, with an excellent multithread handling. After installing a client, SoC can be played over Internet against other artificial or/and human players. The integrated ITA helps children to improve their negotiation skills and helps science to improve the theoretical framework, which makes it unique in its kind.

Tell me and I forget. Show me and I remember. Involve me and I understand. -- Old Chinese Proverb

INTRODUCTION

Almost half a century ago, Roberts & Sutton-Smith (1962) started their influential paper “Child Training and Game Involvement” with: “Games are systemic culture patterns which are distinctive, ancient, and widespread...” (Roberts & Sutton-Smith, 1962). In their paper, they explain that games are of all times and places. Moreover, they illustrate the importance of games for our development both as individuals and as society. The statements of Roberts & Sutton-Smith can be considered as a specific instantiation of the old Chinese proverb shown above.

With the rise of the computer, a new type of games was given birth. With the increasing availability and speed of Internet, gaming over Internet evolved rapidly. Similar to traditional (e.g., board)
games, these “digital games” can help its players develop themselves (e.g., on mental or motor skills), provide distraction, or both. In this paper, an intelligent tutoring system (ITS) is introduced that facilitates e-learning through gaming. Such a system should be able to provide individualized instruction, while dynamically adapting to level of knowledge, intelligence, and needs of individual students. Compared to traditional teaching scenarios, an ITS has various advantages; e.g., it is always available, is non-judgmental, and provides tailored feedback (Sarrafzadeh, Alexander, Dadgostar, Fan, & Bigdeli, 2008).

ITSs are developed for a range of purposes; e.g., military (Doesburg, Heuvelink, & van den Broek, 2005). This research deviates from most other research on two aspects: 1) it focuses on a rather fixed age span and 2) its topic: learning negotiation skills. Where other researchers have also focused on specific target groups, in most cases the students were adult or adolescent, we focus on children with the age of 8–12. Negotiation processes are of interest to a range of settings and, consequently, have been studied from a range of perspectives. However, the combination of these two aspects has not been made so far. This, while also children negotiate with both other children and with their parents.

With the aim to train children in negotiating using an e-learning environment, a game was sought that could be utilized for this purpose. The popular board game Settlers of Catan (SoC) was chosen; Table 1 provides a brief description of the game. The use of SoC has another advantage: an open source JAVA implementation of the game was available. Consequently, not the complete game including all its rules had to be implemented.

This chapter introduces an Intelligent Tutoring Agent (ITA) that helps children understand the negotiation processes through playing SoC. It is connected to the open source implementation of SoC. After providing some background information on Games in Education and ITSs, the paper describes the complete process of development of the ITA. It starts with a new theoretical framework on negotiation processes with children, which is founded on 1) Piaget’s theory of child development and 2) adult negotiation strategies, as will be described in the section ‘Theoretical framework’. Next, the validation of this theoretical framework is described. The development of the ITA itself is described in the section ‘Design and implementation’. Next, the testing of the ITA is described in the section ‘The ITA in practice’. The paper ends with a Discussion in which we reflect upon the work presented.

**GAMES IN EDUCATION**

In order to explain the usefulness of games for education, let us start with a definition of a game. Salen and Zimmerman (2004) define a game as: ‘A game is a system in which players engage in an artificial conflict, defined by rules, that results in a quantifiable outcome.’ (p. 80). This definition contains a number of important elements that need further clarification. We explain these elements in line with the work of Salen and Zimmerman (2004). A system is a set of parts that interrelate to form a complex whole. All systems have four common elements: objects, attributes, internal relationships and an environment. Systems can manifest itself in different ways; e.g., a math-

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**Table 1. Short description of the Settlers of Catan board game, taken from the Mayfair website:** http://www.mayfairgames.com/

Players are recent immigrants to the newly populated island of Catan. Expand your colony through the building of settlements, roads, and villages by harvesting commodities from the land around you. Trade sheep, lumber, bricks and grain for a settlement, bricks and wood for a road, or try to complete other combinations for more advanced buildings, services and specials. Trade with other players, or at local seaports to get resources you might lack. The first player to achieve 10 points from a combination of roads, settlements, and special cards wins.