Collaborative Process Analysis Coding Scheme (CPACS): Examining the Macro- and Micro-Level of Students’ Discourse in a Virtual World

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ABSTRACT

The purpose of this paper is to demonstrate the value of using discourse analysis to understand users’ interactions in a scenario-based virtual environment. This study investigated six dyads’ synchronous discourses while they worked side-by-side to plan and implement goal-related decisions in a virtual inquiry. The Collaborative Process Analysis Coding Scheme (CPACS) was adopted for the analysis. The cumulative analysis indicates that the participants in the control group spent more time on average defining the problem and developing solutions, and spent less time off task than the participants in the experimental condition. Overall, the pairs that were able to plan goals, reflect on past experiences and use the workbooks were better able to progress through the inquiry.

Keywords: Collaboration, Collaborative Process Analysis Coding Scheme (CPACS), Discourse Analysis, Game-Based Learning, Inquiry Learning, Scenario-Based Virtual Worlds

INTRODUCTION

There is a growing academic interest in the use of virtual environments and serious games in education which is part of a growing trend to develop personalized learning experiences (Freitas & Neumann, 2009). Concomitantly, there is a growing interest in how students can be effectively assessed when using these environments (Shaffer & Gee, 2011; Wouters, Spek, & Oostendorp, 2011). The proliferation of technologies designed to provide learners with an immersive and enriched learning experience, presents new challenges for practitioners in understanding what learners are actually doing while using the innovation and how this impacts upon the design of the space and learning materials. Traditional forms of measurement, such as pre-and post-tests, surveys and interviews provide a wealth of knowledge on learning in virtual environments (see, for example, (Barab et al., 2009; Jacobson, Lee, Hong Lim, & Hua

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Low, 2008; Ketelhut & Dede, 2006); however, they often leave a gap in knowledge about what the learners are doing, saying and responding to when solving problems in an immersive environment.

This paper introduces Collaborative Process Analysis Coding Scheme (CPACS) as a means of analyzing collaborative discourse. While there are many studies examining discourse in collaborative environments (see, for example, (Kapur & Kinzer, 2009; Mazur & Lio, 2004; Soter et al., 2008)) there are only a small number of studies focusing on virtual and game-based environments, and few that use multiple coding schemes. These studies rely on chat data between remote participants to examine human collaborative activity (see, for example, (Keating & Sunakawa, 2010; Steinkuehler, 2006)). This study investigated six dyads’ synchronous discourses while they worked side-by-side to plan and implement goal-related decisions in a virtual inquiry. Here, we show how through analyzing the learners’ discourse we can make sense of how they are collaboratively using a virtual environment. The rationale for this investigation is to identify strategies that lead to successful partnerships and problem solving in order to inform the design of educational resources to support learning in a virtual environment. By building up our knowledge of multiple perspectives of the same dataset, we begin to better understand the processes that occur between the design of the tool and the activities, and the learning outcomes observed. In this paper, we first provide an overview of Virtual Singapura, the learning environment, and an overview of CPACS. This is followed by an analysis of the dyads’ conversations and a discussion of the results.

BACKGROUND

This research study was conducted in a scenario-based virtual environment. Here, we differentiate between this type of environment and places, such as Second Life, due to the intended purpose of the immersive environment. The main distinction between a virtual environment and a scenario-based virtual environment is that a virtual environment often mimics “real” life in that lectures, meetings, classrooms are all held within the immersive virtual space (Dalgarno, Lee, Carlson, Gregory, & Tynan, 2011; Kirriemuir, 2010). A scenario or narrative-based virtual world is founded on a story or narrative and information is built into the environment (Barab et al., 2009). In Quest Atlantis, the story is presented through an introductory video, novel and comic book, which involve mythical characters and a set of social commitments. The “questor” (participant) is invited to the mythical planet of Atlantis to investigate a range of social and environmental problems that are parallel to issues on Earth (Barab et al., 2005). The narrative helps to establish continuity among the core elements and helps to link the fictional world of Atlantis with the real world of Earth. River City is another well-known virtual environment that is scenario-based (Ketelhut, Clarke, & Nelson, 2010). Both of these environments have been designed for secondary school students, rather than higher education institutions.

Research has shown that virtual worlds are viable tools for enabling student-centered, collaborative inquiry and are an alternative to more traditional or conventional types of scientific inquiry (Barab et al., 2009; Keating & Sunakawa, 2010; Ketelhut, 2007; Ketelhut et al., 2010). Virtual Singapura was based on Harvard’s River City. The scenario is similar in that the residents of the town were affected by three different types of disease: water borne, air borne and insect vector. River City is set in the United States, and Virtual Singapura, as the name suggests, was set in Singapore. Both of the MUVEs were designed to facilitate the learning of scientific inquiry skills (Jacobson et al., 2008; Ketelhut et al., 2010). Virtual Singapura is set in 19th century Singapore and is based on historical information about several disease epidemics during that period. In order to create an authentic learning experience, 19th century artefacts from Singapore were included in the environment. These artefacts include historical 3D buildings and agents that
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