Structure in Inquiry Learning: an investigation into the impact of structure in Multi-User Virtual Environments

Shannon Kennedy-Clark
Centre for Research on Computer Supported Learning and Cognition, Faculty of Education and Social Work, University of Sydney

Abstract: The purpose of this research project is to gain an understanding of the impact of structure in inquiry learning in multi-user virtual environments. The research will investigate the impact of low to high structure activities and high to low structure activities on students’ learning outcomes. The research will focus on the initial stages of the activities in order to see if it is more advantageous for learners to commence with highly structured or unstructured activities.

Structure and Sequence in Inquiry Learning

The ability to solve a inquiry problems is a requirement of many learning situations. However, learners are often taught how to solve inquiry problems through the use of highly structured activities and are not afforded opportunities to engage in process such as defining the problem, creating hypotheses and testing these hypotheses without the accompanying structure. Reducing the degree of structure initial activity in a sequence of inquiry activities in a Multi-user Virtual Environment (MUGE) is learning strategy that provides an alternative to the guided inquiry approach that underpins MUVEs such as Quest Atlantis and River City (Jacobson, Kim, Miao, Shen, & Chavez, 2008; Ketelhut, Dede, Clarke, & Nelson, 2006). While a degree of structuring is needed, allowing students to engage with a problem without structuring in the initial stage of the activity may encourage the activation of non-domain specific knowledge and recognition of gaps in knowledge.

This research proposes that a treatment that uses the opposite arrangement - beginning with low structure activities and increasing the structure in subsequent activities may also provide benefits for the learners.

Multi-User Virtual Environments

A multi-user virtual environment (MUVE) is an immersive virtual environment that is different from other online learning management systems in that it is derived from the gaming industry and provides an enriched experience complemented by audio and 3D dimensional imagery that is designed to immerse a learner in a virtual world.

A respectable body of research indicates that the benefits of using MUVEs in a learning environment include participant empowerment; increased learner engagement and motivation; development of a field of expertise; development of a community of practitioners; and increased technological literacy and to build a sense of community with participants.

MUVEs, however, are not without their limitations. As yet research in the field has to yield significant findings on the transfer of skills and how learners navigate through an environment and what processes they use to engage with and attempt to solve a problem.

Verbal Communication Analysis

In this research verbal communication analysis (VCA) will be used to analyse spoken communication and will complement other forms of data collection. VCA draws together elements of discourse analysis and conversation analysis and focuses on verbal communication between group members and how groups converge on a course of action. Video, audio and screen capture technology will be used to record the students while they interact with the virtual environment within their group.

The data will be transcribed and coded on two levels – the first level will code for interaction items that lead to a convergence and whether it is a convergence that leads to success or failure, this will include coding for themes such as agreement, attitude and function. The second level will code for features such as modality, tense and feature of speech. This dual level of coding should provide a more detailed picture of the interactions.

The audio recordings and screen capture software will provide two rich sources of data. Firstly, verbal utterances and participant turn-taking can be analysed to see how students engage with each other during the activity and to see if there are discernable differences between a high to high structure and high to low structure treatment and a collaborative or individual treatment (Sawyer, 2006). Secondly, screen capture software can capture online chat, screens and can provide pertinent information into what aspect of the environment the learners are focusing on (Mazur & Lio, 2004).

A broad analysis of this data can express whether students are claiming, predicting, eliciting, creating and acting and can be coded to see how students collaborate when trying to solve or engage with the problem domain. The value of this as Sawyer (2006) indicates, is that to date, very few studies have examined how collective group dynamics can impact upon a learning experience. Moreover, this rich and observable source of data represented by sounds words and expressions can show turn-taking and subtleties of how communication and shared understanding while focusing on the activity is achieved in far greater depth than a post-intervention questionnaire or post-test (Mazur, 2004).

References


