G52GRP Final Report

EduCraft

Minecraft as a Collaborative Learning Tool

Group gp13-pxb1:
Tosin Afolabi (ooa02u)
Janos Bana (jxb12u)
Eze Benson (exb02u)
Ali Kerr (axk02u)
Ian Knight (iak12u)
Ying Wang (yxw03u)

March 25, 2014

Contents

Chapter 1

Introduction and Background

The EduCraft project is concerned with developing a series of extensions[1] for the popular computer game Minecraft, aimed at promoting collaborative learning in primary schools, particularly with reference to numeracy education. In this first section, some of the advantages of collaborative learning are explored in contrast to conventional teaching methods, and the game of Minecraft is introduced in the context of education.

1.1 Collaborative learning

> "Group interaction allows students to negotiate meanings, to express themselves in the language of the subject and to establish a more intimate and dialectical contact with academic and teaching staff than formal methods permit." [3, p. 1]

Group work has long been recognised as a key component in any form of successful education—it enables students to become more involved in their own work, and to engage with it in a different manner from what is normally seen in classroms. Johnson and Johnson observe that "The human species seems to have a *cooperation imperative*", and that cooperation plays a central role in most areas of life [4, p. 12].

Collaborative or cooperative learning is contrasted with two other 'goal structures': competitive learning, and individualistic learning. Competitive learning consists of activities which set the students tasks which some are expected to 'win', by getting the highest score or completing the activity in the shortest time, for example. Individualistic learning is learning where there is no interaction between students at all—no comparisons are made, and students are solely concerned with working by themselves.

Johnson and Johnson argue that each of these goal structures has a role to play in education, but that each is suitable for different purposes [4]. Collaborative learning, specifically, is to be used in situations where the material being taught is especially complex or conceptual. This makes it ideal for use in maths lessons: Yackel, *et al.* describe the benefits of group work in teaching maths to second-grade[2] students in the US [8].

[1] These are commonly called 'mods'. Throughout the report, we will refer to our product as 'the mod'.

[2] Roughly equivalent to year 5 (ages 7–8) in the UK

1.2 Minecraft

> "Minecraft is a game about breaking and placing blocks. At first, people built structures to protect against nocturnal monsters, but as the game grew players worked together to create wonderful, imaginative things." [6]

Minecraft was initially developed in 2009, as a game where players could explore a randomly-generated world and place blocks to build structures. From the outset, Minecraft was not designed as a game that could be 'won'—in game industry terms, it was intended to be a 'sandbox' game where players set their own goals.

There have been a number of articles written exploring the potential use of Minecraft in supporting education [1], [7]. Habgood has already established the usefulness of computer games in general in education [2]; the question is whether Minecraft can be used in the ways that he suggests. This is what EduCraft seeks to establish, at least tentatively.

The official Minecraft Wiki has its own page dedicated to describing possible ways of using Minecraft in education [5], and suggests using the game's in-built system of building items:

> "The crafting system can help in teaching basic math (e.g. I need 3 Sugar Cane for Paper), which transitions to multiplication (I need 3 Paper and 1 Leather for a Book, and 3 Books for a Bookshelf, so I need 9 Paper and 3 Leather all together) and division (When I create Paper I get 3 at once, so $9/3 = 3$ times per Bookshelf I'll have to create Paper)."

We intend to build something more overtly mathematical than this basic concept, and the remainder of the report describes the requirements that have been set for the project, along with a record of our initial design and prototypes.

Chapter 2

Requirements

Chapter 3

Design

Chapter 4

Implementation

Chapter 5

Reflections

Bibliography

[1] J. Brand and S. Kinash, "Crafting minds in minecraft," *Learning and Teaching papers*, vol. 53, 2013.

[2] M. P. J. Habgood, "The effective integration of digital games and learning content," Ph.D. dissertation, University of Nottingham, July 2007.

[3] D. Jacques and G. Salmon, *Learning in Groups*, 4th ed. Abingdon, England: Routledge, 2000.

[4] D. W. Johnson and R. T. Johnson, *Learning Together and Alone*, 4th ed. Needham Heights: Allyn and Bacon, 1994.

[5] Minecraft Wiki, "Minecraft in education - Minecraft Wiki," December 2013. [Online]. Available: http://minecraft.gamepedia.com/Minecraft_in_education

[6] Mojang AB, "Minecraft," November 2013. [Online]. Available: http://www.minecraft.net

[7] D. Short, "Teaching scientific concepts using a virtual world - minecraft," *Teaching Science*, vol. 58, no. 3, 2012.

[8] E. Yackel, P. Cobb, and T. Wood, "Small-group interactions as a source of learning opportunities in second-grade mathematics," *Journal for Research in Mathematics Education*, vol. 22, pp. 390–408, 1991.