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**How Maui captured the sun:
using a MUD for educational
simulation**

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How Maui captured the sun: using a MUD for educational simulation

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MUDs (Multi-User Dungeons) are text-based, multi-user communication and modelling programs. This paper investigates the potential of a popular extensible MUD, the LambdaMOO system, as a tool for second language training and for educational simulation gaming.

Keywords: language learning; MUD; MOO; adventure gaming; educational simulation; Maori

Introduction

One type of software with potential for providing computer-supported language training is adventure games – currently a powerful, but under-utilized, tool for language learning. These games are attractive in that students learn in the context of active engagement in a task, rather than by the more esoteric text manipulation of a vocabulary drill; and the learning environment is by default student-centered rather than teacher-centered, with the teacher facilitating student exploration (Baltra, 1990). Several games have been developed specifically for this purpose, most notably the Mystery House. This game gives practise in ordinary household vocabulary, and has had a large number of classroom activities designed around it (Baltra, 1984).

However, adventure games tailored to language learning are relatively scarce, and a given game may not be suitable for a particular textbook or language learning approach. Language teachers also use commercial games (such as the popular Where in the World is Carmen Santiago; Meskill, 1990) or develop their own games with authoring kits. A number of problems have been recorded for these approaches. Commercial games are frequently based on fantasy worlds, and may use esoteric vocabulary terms. Their value in providing language practise for real-life situations is therefore often limited (Taylor, 1990). Authoring software allows instructors to tailor a game to a particular course requirements, but the commonly available programs are reported to be difficult to use (particularly for those with limited programming skills). More fundamentally, all these types of games are single-user and permit very limited user input. Students cannot practise writing in the language they are learning, since available games have very limited parsers and accept only short commands (ie, “get laser”, “shoot alien”). Instead, the language training comes in assigning several students to play the same game together, so that they orally discuss the next game move (Baltra, 1990; Taylor, 1990; Jordan, 1992).

A second thread in the innovative use of computers for second language learning has been the development of electronic discussion groups supported by email or groupware (bulletin boards, UseNet Newsgroups, or Lotus Notes-type products). Language, whether employed in reading, writing, or speaking, is intrinsically a social activity (Cooper and Holzman, 1989); these products reinforce the social experience, and provide more or less realistic language play for students. Typically, groups of students discuss

ties between slaves and slave owners in pre-Civil War Southern US (Campion, 1987); Medieval Lords familiarizes students with the problems of establishing and keeping a kingdom in the Middle Ages (Campion, 1992); and the classic BAFA-BAFA illustrates the problems of culture shock, ethnocentrism, and enculturation (Tornay-Purta, 1984). Since MUDs were originally constructed for role-playing – albeit for recreation, not education – it is not surprising that they provide a rich environment for more seriously intended simulations.

Implementation platform

The local MUD was implemented in LambdaMOO version 1.7.7, running under the UNIX operating system (SUNOS 5) on SPARC stations. A central machine is designated as the "server" that holds the MUD database and which runs the core MUD software. Since MUDs are text-only, they require relatively little processing power (in contrast with more ambitious simulation systems that support graphics). Students log in to the server MUD through machines running "client" software. A client provides better display features (including word wrapping and highlighting) than simply telnetting to the MUD.

The LambdaMOO is a MOO, or "MUD object oriented", developed at Xerox Parc. The system includes a programming language that allows complex and interesting simulations to be developed. The Unix hardware platform was chosen primarily for its ready availability. A similar system could also be constructed on networked PCs or Macs. Both client and server software is free, and is available by anonymous ftp from <ftp.parc.xerox.com>.

A simulation of a Maori myth

When constructing a simulation incorporating elements of Maori culture and its concepts, we had to look at how Maori culture is best conveyed. Obviously a culture is expressed through its language and its literature, but just reading about the culture does not provide enough knowledge about it – an individual learning about the culture must have some way of experiencing it, directly or indirectly. As Maori beliefs are communicated primarily through the telling of legends, it was decided to base the MUD simulation on a re-enactment of one of these myths.

"How Maui caught the sun" tells the story of the famous Maori hero Maui and his brothers, who captured the sun (Tama-nui-te-raa) because the sun raced across the sky and people did not have enough time to do their daily work. After travelling to the pit where the sun lives, Maui and his brothers hid until the sun was almost ready to come out. Once it rose, they bound the sun with ropes and Maui beat the sun with a jawbone until the sun agreed to travel across the sky more slowly. This story is told to Maori children, as an explanation for why the sun travels at exactly the speed that it does.

This legend is well-suited to interactive simulation because it has several active characters (unlike a number of other legends involving only a single character, or a central character with several very minor characters). The participants must work together to find or manufacture tools to make the ropes needed to hold the sun, and to use the ropes to hold the sun. Each player in a MUD simulation must be associated with a MUD character, which is usually created by the player. In the Maori legends MUD, we provide six characters--Maui and his brothers--of which at least two must be used in a session (including, of course, Maui himself).

Timata

You have entered the realm of myths and legends!!! Here, you will relive the adventures of heroes such as Maui, Tinirau, and many more. Your first adventure is to re-enact the story of how Maui slowed the sun. To the north, there is a small village.

>go north

Settlement

You are at a small village. There is no one around, but the houses look very interesting. To the south is the gateway, to the north is a dusty track, east is the storage building, and to the west is the dining hall.

Figure 1: Entering the MUD simulation (English version)

A MUD's interface is entirely text-based, and is similar to that of the computerized text adventure games (such as Adventure and Zork) upon which the original MUDs were based. A MUD environment is organized by discrete virtual "locations", for historic reasons referred to as rooms. Typically, each room has associated with it a text description that is displayed when the MUD character moves to that place. In Figure 1, for example, the character has logged into the initial location (Timata, or "start"). To move from one place to another, the character uses simple directional commands ("go north", "go south", etc.). Figure 2 graphically depicts the areas implemented in the MUD; these are further described in the Appendix.

The programming language associated with the LambdaMoo system permits MUD designers and designated players to create text-based objects that players can interact with. For example, in Figure 3 a character obtains the necessary raw material for a rope by using an axe object to cut fibers from a flax bush object. These objects are items held in a system database, described by text strings and with associated actions (programs defining what MUD commands access the object, and defining the effects of a command on an object). All users manipulate the same database of objects, and can simultaneously access the same object.

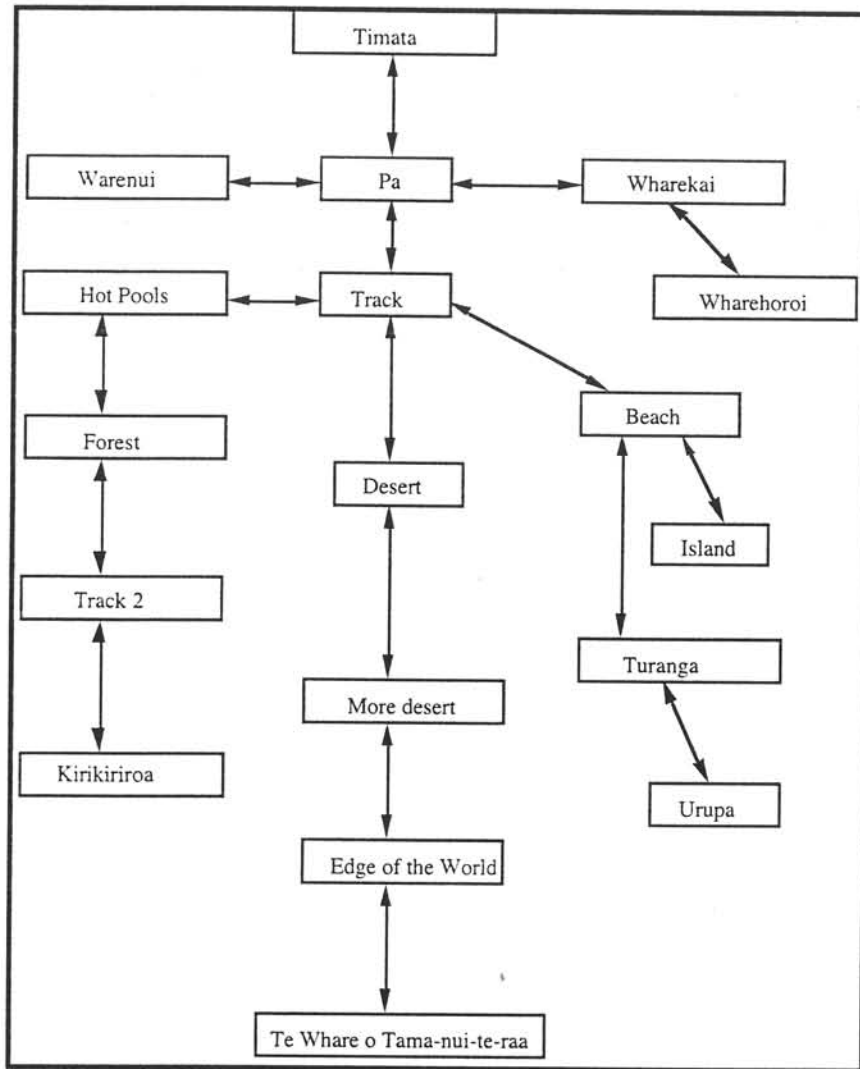


Figure 2: locations in the MUD simulation

Autonomous objects or "robots" can also be created. A robot can mimic a human player by "talking" to other characters, or by performing actions on MUD objects. We have added a *kairiake*, or spiritual guide, that gives helpful hints to players if they have been inactive in an area over a certain time, or if they are not locating the appropriate objects needed to capture the sun.

```

>look
You see a flax bush and an axe here.

>cut flax bush
you must have an axe before you can cut the bush.

>take axe
You pick up the axe.

>cut flax bush
You cut at the flax bush fiercely with the axe, and it splits into three pieces.
  
```

Figure 3: Interacting with objects in the simulation

Characters communicate with each other by using the "say" command. For example, if Maui types

```
>say Does anyone know where to find flax?
```

then every player in the same "room" will see

```
Maui says, "Does anyone know where to find flax?"
```

More sophisticated users can use the "whisper" command to direct communications to only one other user, or the "emote" command to indicate non-verbal communication. For example,

```
> emote brandishes an axe fiercely
```

will display the following on all players' terminals:

```
Maui brandishes an axe fiercely.
```

Software modifications

Sound effects were added to the MUD to enhance the realism of the environment, primarily to add background information for a location. For example, a player entering a forest will hear bird calls and the sound of wind whistling through the trees. Since MUDs are text-only, extending the system to include sound required minor modifications to the client program. Appropriate recordings were located and converted to SUN AU format sound files (8 bit mono sound, 14.4 MHz), and each sound file was associated with a MUD object. When the object is accessed (eg, when a player enters a forest), the correct sound file is located, its name placed in a buffer, and the UNIX utility *audioplay* is invoked to play the recording.

For the Maori language version of the MUD, the command parser of the system was modified to replace the built-in English commands with Maori terms. This process required more than a simple term for term substitution, since the word ordering required by Maori is not the same as English and proper (grammatical) Maori cannot be abbreviated in the same way as English. For example, in the usual English language versions a player obtains a list of items currently being carried by issuing the command "inventory". In Maori, they must type "he aha i roto i taku kite" ("look at what you are carrying").

Cultural considerations

Approval from Mr. Williams' family elders was sought and obtained for the inclusion of elements of Maori culture in the MUD. They provided advice on which concepts were suitable for depiction, judged whether the protocols and cultural elements were represented accurately, and provided information on conflicting interpretations that could arise from other Maori groups. In addition, the Maori text was carefully edited to accommodate as many of the Maori dialects as possible.

Evaluation

This software was tested on two groups of users: those with Maori language backgrounds, to explore the usefulness of the program for written Maori practise; and users without Maori language skills, to investigate the use of the English version of the MUD as a cultural simulation tool.

The Maori version was tested on four subjects who had relatively little experience with computers but strong Maori backgrounds. Their responses to the project were very positive, in that they saw Maori concepts, culture, and language used in a new and innovative way. They needed little initial training to use the system, and reported no difficulties in communicating in Maori through the MUD software. The parser modifications were judged to be adequate in enforcing a correct Maori word order for commands.

The subjects commented favorably on the accuracy of the portrayal of Maori traditions and protocols. However, the MUD should not be used in isolation; a session should be accompanied by a de-briefing, as inevitably important details are lost in simulations. For example, to keep the expected length of a session within an hour the powhiri (greetings, introduction of visitors, and invitation to enter the marae) was greatly curtailed, since this ceremony is quite lengthy. Other elements of Maori culture could not be readily simulated, such as the proper physical attitude when entering a marae.

The English language version was more formally tested on 19 computer science undergraduates. They were guided through a session with the MUD in groups of three and four, and provided with a questionnaire to critique the MUD as a simulation tool. The majority of subjects felt that the MUD location descriptions were clear and easy to follow, and that objects in the MUD were appropriately described and could be easily manipulated. The sounds that had been added to the MUD were reported to be useful in adding realism to the simulation, and were judged to be of high quality. The communication features of the MUD interested the players, and were used extensively – particularly in discussing how to obtain necessary objects. However, there was concern with keeping track of messages appearing on the screen, since when several people “talk” the messages can scroll too quickly to be read. As noted above, this problem may also be an advantage, in that extended use of a multi-user conversational system may improve student reading speed (Kelm, 1992). In addition, physical cues are absent in the MUD, making it difficult for students to tell who a message is directed to. In ordinary conversation, we know whether a comment is directed to a group in general or to a specific individual by the eye contact and body language of the speaker. In MUD conversation, however, all “say” commands appear on each player’s screen.

Applicability of MUDs/MOOs to educational use

One frequently reported problem with using current single-user adventure game authoring tools in an educational setting is that they require computing abilities beyond those held by the average language instructor. Installing a MUD certainly demands familiarity with programming, and a language instructor would most likely require technical support in setting up and maintaining a useful system. Creating a simple simulation environment inside the MUD, is not a difficult task--the MUD itself handles inter-student communications, and developing a new environment is largely a matter of entering text descriptions of objects. More complex objects such as robots will require experience in programming, however, as will adjusting the command parser to handle non-English language patterns. In short, while these systems are useable by instructors with very modest computer experience, tapping their full power demands a relatively high degree of computer comfort and skill in use.

MUDs in general, and LambdaMoo in particular, have been shown to be useful communications tools for supporting software systems development (Evard, 1993). We believe that many of these same traits also make them well-suited as a platform for written second language practise and educational simulation :

- virtual representation of reality: Simulation designers can create arbitrarily rich simulation environments, including as many objects or setting details as are necessary to permit the suspension of disbelief by participants that is necessary for a successful simulation session – to the extent that "mud addiction" is a well-documented

phenomena! Examples of entertainment or socially oriented MUDs that meet this criteria are well documented (Bruckman, 1992; Curtis, 1992). Despite the text-only interface, a sufficiently stimulating and creatively designed MUD can engage participants in the gaming situation.

- real time, interactive communication: messages are directly and quickly exchanged between students, or between a student and the MUD environment. This speed in communication adds to the sense of realism in the simulation.
- networked architecture: each student participates from a different client computer, eliminating problems with turn-taking or screen viewing found with single-computer simulations (Baltra, 1990; Taylor, 1990). In addition, the use of networked services means that simulation participants can be spread across a wide geographic region. This capability offers two further advantages: participants are not restricted to a single classroom, but can include students from several different schools, or even different countries; and students can be physically separated to enforce anonymity in their simulation participation, so that social constraints present in face-to-face simulations are lessened and the simulation experience is intensified.
- multi-user: games can involve any number of participants, with the upper limit being defined by practical requirements of the game itself, rather than the software. Popular Internet-accessible MUDs, for example, report 50 or more participants during peak hours.
- extensible system: The programming language embedded in the LambdaMoo system can be used to create new "rooms", objects, and commands, as well as to link to external software. The simulation can be tailored by the local designer to suit the educational needs of a given set of students to a greater degree than is possible with most commercial adventure game construction products.
- restricted access: Only people with assigned characters on the MUD can connect to it (in the absence of "guest" characters). This feature prevents other users on the computer network from interrupting the session or gaining unauthorized access during a MUD session. In addition, character privileges can be restricted as well, so that participants cannot alter the environment or create new objects.
- recorded session history: A MUD session is conducted entirely in typed text, and a full session log can be automatically provided. This transcript is extremely useful for de-briefings, as it provides a detailed and objective record of the events of a session.

For effective educational use, it is important that the MUD session be facilitated by the instructor. However well designed, computer adventure games will sometimes frustrate students who cannot solve the game puzzles or determine the actions needed to finish the game. Our kaitiake (spirit guide) provided sufficient help for most students, but some sessions still required human intervention for successful completion. This problem has been noted with classroom use of single-user simulation games (Jordan, 1992). A MUD provides a novel, though partial, solution through the opportunity to introduce automated help from programmed "robots" such as the kaitiake.

Finally, the MUD session must be accompanied by a de-briefing – conducted either on the MUD itself, or in the classroom. For second language learning, MUD interactions allow students to practise spontaneous written conversation. Feedback on grammar and usage should follow the session, to avoid stemming the flow of communication or introducing anxiety about correct writing. For educational gaming, such as the English-language version of the Maori myth, de-briefings are vital in pointing up the inevitable modelling flaws present in any simulation, as well as to reinforce and interpret student experiences in the gaming session.

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Appendix 1: Educational MUDs accessible by Internet:

MundoHispano is a MUD designed for Spanish language learning. It is inhabited by a community of native speakers of Spanish from around the world, teachers and learners of Spanish, and computer programmers. The MUD was developed with the support of the Syracuse University department of Languages, Literature s and Linguistics and ERIC's AskERIC project.

homepage: <http://web.syr.edu/~lmturbee/mundo.html>
to log in, telnet to [io.syr.edu](telnet://io.syr.edu) 8888

schMOOze University is a provides an environment where people studying English as a second or foreign language can practice English. Students have opportunities for one-on-one and group conversations as well as access to language games, an on-line dictionary, USENET feed, and gopher access.

to log in, telnet to [arthur.rutgers.edu](telnet://arthur.rutgers.edu) 8888

DU (Diversity University) is a MOO designed for teaching at the university level. Instructors can bring their own classes to either use existing facilities that are there or they create "classrooms" to their own liking.

homepage: <http://pass.wayne.edu/DU.html>
to log in, telnet to <telnet://155.31.1.1>:8888

non-English MUDs/MOOs:

Le MOO Francais: a French language MOO
telnet [logos.daedalus.com](telnet://logos.daedalus.com) 8888

LittleItaly: an Italian language MOO
telnet [ipo.tesi.dsi.unimi.it](telnet://ipo.tesi.dsi.unimi.it) 4444

MorgenGrauen LPmud:a German language Mud
telnet [mud.uni-muenster.de](telnet://mud.uni-muenster.de):4711

UNItopia: a German language Mud
telnet [infosgo.rus.uni-stuttgart.de](telnet://infosgo.rus.uni-stuttgart.de):3333

MOOsaico: a Portuguese language MOO
telnet [moo.di.uminho.pt](telnet://moo.di.uminho.pt) 7777

SvenskMud: a Swedish language Mud
telnet [svmud.lysator.liu.se](telnet://svmud.lysator.liu.se) 2043

Additional information on educational uses of MUDs is available at
<http://tecfa.unige.ch/edu-comp/WWW-VL/eduVR-page.html>