

Educational Game System Software Requirements Specification

Version 1.0

UCSE's Educational Game System	Version: 1.0
Software Requirements Specification	Date: 03/02/06
LSS.Educational.Game.RS-1.0	

Revision History

Date	Version	Description	Author
01/Feb/06	0.1	Created and divided the work	Thanh
02/Feb/06	0.11	Created content for sections 2.3 and 3.2.	Aaron
03/Feb/06	0.12	Incorporated Charles' and Mindy's work	Mindy, Charles, Thanh
03/Feb/06	0.13	Worked on sections 3.2, 3.3 and 3.5	Aaron, Rizwan
03/Feb/06	0.14	Additions to sections 2, 3	Jeff, Aaron, Thanh, Rizwan
03/Feb/06	0.15	Reformat, Appendix	Thanh, Aaron, Jeff, Rizwan, Mindy
03/Feb/06	0.16	More reformatting	Thanh, Aaron, Jeff, Rizwan, Mindy
03/Feb/06	0.17	More reformatting and proof reading	Thanh, Aaron, Jeff, Mindy, Rizwan
03/Feb/06	0.18-0.19	Group proof reading	Mindy, Aaron, Jeff, Rizwan, Thanh
03/Feb/06	0.20	Proof reading / Editing	Rizwan
03/Feb/06	0.21	Proof reading / Editing	Jeff
03/Feb/06	0.22	Proof reading / Editing	Aaron

UCSE's Educational Game System	Version: 1.0
Software Requirements Specification	Date: 03/02/06
LSS.Educational.Game.RS-1.0	

Executive Summary

This document is the Requirements Specification document for the UVic Center for Scholastic Entertainment (UCSE) Educational Game Project. It provides detailed descriptions of the software, user, and hardware interfaces of the system, and includes a detailed description of the user interface for the system.

UCSE has chosen Long Stretch Software Developers Inc to design and implement an educational game designed to help students in grades 1 & 2 with Math, English and problem-solving skills.

The intention of the game is to allow the users to practice their mathematical and English skills in a fun and entertaining manner. It will also be a tool for teachers to evaluate the students. Teachers of the grades 1 and 2 students will use the game to track development in individual students and as a possible marking guide. Teachers will also export relevant data for creating spreadsheets and graphs of individual and group performance. The game will be also be available for home use so that Parents of the students are able to see the progress of their child(ren).

The objective of the Software Requirements Specification is to provide a summation of the findings thus far in the development stage of the project. It will be treated as a working document and provides a detailed outline of the system from the client's perspective.

UCSE's Educational Game System	Version: 1.0
Software Requirements Specification	Date: 03/02/06
LSS.Educational.Game.RS-1.0	

Table of Contents

Executive Summary	3
1. Introduction	6
1.1 Purpose	6
1.2 Scope	6
1.3 Definitions, Acronyms and Abbreviations	6
1.4 References	6
1.5 Overview	6
2. Overall Description	7
2.1 Product Perspective	7
2.1.1 System Interfaces	7
2.1.2 Interfaces	7
2.1.3 Hardware Interfaces	7
2.1.4 Operations	7
2.2 User Characteristics	7
2.3 Constraints	8
2.4 Assumptions and Dependencies	8
3. Specific Requirements	9
3.1 Usability	9
3.1.1 The system will test basic computer abilities prior to beginning the game, and provide the necessary tutorials.	9
3.1.2 The system will provide in-game tutorials and help	9
3.1.3 Maximum time from launching the game until it is playable will be 5 minutes	9
3.1.4 Familiar user interface provided for Children	9
3.1.5 Familiar user interface provided for Teachers	9
3.1.6 Long Stretch Software will work with SME's to ensure that the system will be usable by all parties	10
3.2 Reliability	10
3.2.1 Availability – The software will be able to run 99% of the time when launched.	10
3.2.2 Expected system uptime will be 95%	10
3.2.3 Online backup will be provided by the system	10
3.2.4 The system will not be prone to errors caused by unexpected input	10
3.2.5 The system will maintain network security	10
3.2.6 System will detect and correct errors in imports and exports from Office file formats	10
3.2.7 Time between failures will be minimized for each operating system that will run the game (see details)	10
3.3 Performance	11
3.3.1 Degradation modes	11
3.3.2 Resource utilization	11
3.4 Supportability	11
3.4.1 The game will run on multiple computer platforms	11

UCSE's Educational Game System	Version: 1.0
Software Requirements Specification	Date: 03/02/06
LSS.Educational.Game.RS-1.0	

3.4.2 Portability	11
3.4.3 The system will be upgradeable.	11
3.4.4 The system will not require regular maintenance	11
3.5 Design Constraints	11
3.5.1 Software development language	11
3.5.2 Development tools	11
3.6 Online User Documentation and Help System Requirements	12
3.7 Interfaces	12
3.7.1 User Interfaces	12
3.7.2 Hardware Interfaces	12
3.7.3 Software Interfaces	12
3.8 Licensing Requirements	13
3.9 Legal, Copyright and Other Notices	13
4. Appendices	14

UCSE's Educational Game System	Version: 1.0
Software Requirements Specification	Date: 03/02/06
LSS.Educational.Game.RS-1.0	

1. Introduction

Long Stretch Software (LSS) provides custom software development services. We can handle all the developmental aspects of a software project including specification, architecture & design, implementation, testing, maintenance and training. We work with you to help us understand your problems and needs, and then we work out the best possible solution(s) for you. We always involve our clients in each and every aspect of the software development process by providing prototypes and encouraging feedback. This helps ensure that our clients are highly satisfied with the end product.

1.1 Purpose

This document is a proposal for requirement specifications in response to the UVic Center for Scholastic Entertainment's Request for Proposal posted on January 16, 2005. The LSS team is very excited about the idea of the game and prospects of working on its development. We are also very confident that our level of expertise and experience in the industry will match the sophistication of the game's requirements.

1.2 Scope

The requirements specified in this document will be used for designing all the aspects and components of the game. The document will be updated as the requirements grow and change over the design and development process.

1.3 Definitions, Acronyms and Abbreviations

LSS = Long Stretch Software Incorporated
RS = Requirements Specifications
RSP = Request for Proposal
TCP/IP = Transport Communication Protocol/ Internet Protocol
FTE = Fulltime Equivalent
SME = Subject Matter Expert
Java = Sun's Java Language: Provides multi-platform support
JRE = Sun's Java Runtime Environment
Eclipse = An IBM IDE
IDE = Integrated Development Environment
EULA = End Users Software Agreement
IP = Intellectual Property
UCSE = UVic Center for Scholastic Entertainment
BA = Business Analyst

1.4 References

UVic Center for Scholastic Entertainment (UCSE) Education Game System: Request for Proposal. Version 1.0.

1.5 Overview

There are two main sections in this document:

- Section 2 will provide an overview of our vision of the game including our perspectives of the game, assumptions of user characteristics and interactions, and some design constraints.
- Section 3 will go into detail for each requirement: usability, reliability, performance, supportability, design constraints, documentation, and interfaces.

UCSE's Educational Game System	Version: 1.0
Software Requirements Specification	Date: 03/02/06
LSS.Educational.Game.RS-1.0	

2. Overall Description

2.1 Product Perspective

There are three main components of the system:

- Client game: where the player plays.
- Admin module: provide admin interface to the teachers, administrators, and parents.
- Database backend: where all of the data such as player statistics, game states, etc. are stored.

2.1.1 System Interfaces

The database server and the game client can interact through the LAN.

2.1.2 User Interfaces

The interface for the students will be entertaining and engaging. The function of the buttons will be easy to understand and simple to use. Menus will be interactive and easily accessible throughout the game. Once the game is in playing mode, everything a player/student needs will be clearly visible on the screen and easily accessible. Students will find the most basic functions of the game fun to play, from character creation to the educational exercises.

2.1.3 Hardware Interfaces

The product is required to operate on both Macintosh and Windows systems. As such, the game should be able to adjust to one button mouse input or two button mouse input depending on the system it's running on.

The keyboard will also play an integral role in the student's interaction with the game. Answers to some questions will have to be typed in, and the character movement will be accomplished using either the mouse or the keyboard.

It will be possible to transfer the students results to a server with any standard networking hardware.

The graphical content will be at most 256 colors at a resolution of 640x480. This will allow for the game to be played on older computers commonly found in elementary schools. The amount of graphical content will also be limited to ensure that the total size of the game remains under the 80mb limit.

2.1.4 Operations

The game will provide the following minimal operations:

- Teach Math and English to grade levels 1 & 2 in an entertaining and engaging manner.
- Provide functionality for teachers to track and evaluate student progress.
- Provide user interface and controls for the targeted audience.
- Provide difficulty levels to cater the skill level of the users.

2.2 User Characteristics

This game is targeted directly towards children attending Grades 1 and 2. These grades typically correspond to ages ranging from 6 to 8 years. At this stage in school, children are expected to have rudimentary reading and math skills. Children in this age range tend to have very short attention spans, and great effort must be put in to maintaining their

UCSE's Educational Game System	Version: 1.0
Software Requirements Specification	Date: 03/02/06
LSS.Educational.Game.RS-1.0	

interest. They also tend to be very curious, and may inadvertently cause problems as a result.

Most children probably have had access to computers at home, but this cannot be guaranteed, so some children may not have the computer skills necessary to operate the game without guidance. However, they are generally very good at following patterns and can be taught fairly easily.

Starting with ages between 6-8 years, girls and boys show very different characteristics from each other. They will have very different interests and sources of entertainment: a factor that cannot be ignored. Also, girls tend to be more mentally advanced and developed than boys.

Because the game is intended for in school use, teachers will be administering the game, and must also be considered. Teachers represent a much more varied age range and background than children, but it can be assumed that they will have basic computer skills, such as word and spreadsheet processing, e-mail and web browsing.

2.3 Constraints

The following constraints are specified in the RFP:

- Platform independence is necessary since each school may have a different OS.
- Because a lot of schools are using older systems this game should run on a system with these requirements:
 - **Windows 95 and newer:** Pentium 60, 16 MB ram, 80 MB HDD space, Mouse, SVGA video card, 2x, or better, speed CD-ROM, DirectX compatible sound card.
 - **Mac OS 7.6 and up:** 16 MB ram, 80 MB HDD space, Mouse, SVGA video card, 2x, or better, speed CD-ROM, Monitor Requires 640x480, 256 color
- It will be necessary to test the game on children to ensure that it is entertaining and easy to use.
- The designers will coordinate with teachers, parents, children entertainers, child psychologists and other educators in the development of the software. This is to ensure that the subject matter and educational material is appropriate for the students.

2.4 Assumptions and Dependencies

We assume the following responsibilities from the client during the game development process:

- Dedicate an FTE business analyst to liaison with our developer team. This person must be able to make decisions regarding changes in the requirements.
- Provide testing methods and help in developing the test cases with our test engineers.
- Upon the completion of the development process, organize meetings and workshops with the target user groups to test the software.

In order to finish the project on time, the documentation must be reviewed and signed off within one week of the delivery of our deliverables. The following are the deliverables deadlines requested in the RFP 1.0:

UCSE's Educational Game System	Version: 1.0
Software Requirements Specification	Date: 03/02/06
LSS.Educational.Game.RS-1.0	

January 26	Meeting to discuss RFP
January 30	RS 1.0
February 6	RS 1.1
February 16	Prototype Demo
March 2	Requirements Negotiations
March 6	RS 2.0
March 10	RS 2.1
April 3	RS 3.0
March 30 – April 6	Final Demo

3. Specific Requirements

In this section, we will specify detailed requirements for the game. Our designers and programmers will design and build the game based on these requirements. Throughout section 3, requirements are indicated as functional or non-functional by the symbol (F) or (NF) respectively in the requirement heading. Our tester will work with client BA to implement test cases based on the requirements specified here as well.

3.1 Usability

This section addresses the software usability requirements for the students and teachers laid out in UCSE's RFP.

3.1.1 (F) The system will test basic computer abilities prior to beginning the game, and provide the necessary tutorials.

Basic computer abilities include mouse and keyboard input, and understanding computer displays and feedback (alerts, menus etc). The system will provide a short test to determine the computer skills that the student is lacking, and will then provide tutorials in required areas.

3.1.2 (NF) The system will provide in-game tutorials and help.

The system is intended for use in classes, so the game will need to provide support for students that need help. A single teacher is not be able to help all students all the time.

3.1.3 (F) Maximum time from launching the game until it is playable will be 5 minutes.

After the application is launched, it will take fewer than 5 minutes for the player to load their data and begin playing the game from where they last left off. This will help to ensure that children do not lose interest.

3.1.4 (NF) Familiar user interface provided for children.

The user interfaces for the game itself (including load screens, and in-game menus) will be similar to those found in other children's games. "Similar" here refers to how the menu is accessed, its appearance and how it reacts to input. Menus will also use animations and colors to attract and maintain attention to important items. The game interface will be tested alongside other children's games to ensure that the interface is usable.

3.1.5 (NF) Familiar user interface provided for teachers

The interface for queries will be similar to a web-browser, with regards to navigation and file access. Navigation will use links to follow as well as forward and back buttons. Queries will be made using html-style forms and downloadable files. Responses to system queries will

UCSE's Educational Game System	Version: 1.0
Software Requirements Specification	Date: 03/02/06
LSS.Educational.Game.RS-1.0	

be exported to Microsoft Office (i.e. Word and Excel) formatted documents, providing a familiar interface for data manipulation.

3.1.6 (NF) Long Stretch Software will work with SME's to ensure that the system will be usable by all parties

We will collaborate with teachers, child psychologists and other educators, as well as children to ensure that the system will be useable for people of all experience levels.

3.2 Reliability

3.2.1 (NF) The software will be able to run 99% of the time when launched.

There is a potential for errors relating to the state of the operating system that could prevent the game from launching (for example not enough resources available, etc.). The chance of such an occurrence is at most 1%.

3.2.2 (NF) Expected system uptime will be 95%

The game itself will be able to run for at least 3 consecutive hours, 95% of the time. The back-end database should be able to support up to 100 connections of the game clients, 95% of the time.

3.2.3 (NF) Online backup will be provided by the system

The software will employ mechanisms to ensure that there is no data loss if the game crashes.

3.2.4 (F) The system will not be prone to errors caused by unexpected input

The software will be able to handle all sorts of input and be immune to side effects cause by undesirable inputs (such as buffer overflow), which could potentially create security holes in the system.

3.2.5 (NF) The system will maintain network security

The software will employ appropriate network security protocols to ensure that it doesn't create network security problems.

3.2.6 (F) System will detect and correct errors in imports and exports from Office file formats

The software will be able to import and export data to and from Office formats with minimal data corruption. The software should be able to detect and resolve any data corruption occurrence.

3.2.7 (NF) Time between failures will be minimized for each operating system that will run the game (see details)

Mean Time Between Failures (MTBF) – MTBF is based on the average time of game operation without any repairs or reinstallations. MTBF mainly depends on the software to be run as well as the operating system. The MTBF for target software for various operating systems are listed below.

Windows OS	MTBF in years	Mac OS	MTBF in years
Windows 95/98	1	Mac OS 7.6	2
Windows 98 SE	2	Mac OS 8	3

UCSE's Educational Game System	Version: 1.0
Software Requirements Specification	Date: 03/02/06
LSS.Educational.Game.RS-1.0	

Windows XP/2000/ME	4	Mac OS 9	4
		Mac OS X	5

3.3 Performance

3.3.1 (NF) Degradation modes

In the case of a system failure, students should not be required to repeat material that they have already mastered. Therefore, the student's progress will automatically be saved when goals are completed.

3.3.2 (NF) Resource utilization

The game will occupy at most 80mb of hard drive space. It will also be kept simple enough to run smoothly on a system having no more than a 60 Mhz processor and 16MB of ram. Some of the game content will require access to a 2x CD-ROM drive.

3.4 Supportability

3.4.1 (NF) The game will run on multiple computer platforms.

The game will be supported by a Windows 95 or higher, or a Mac OS 7.6 or higher operating systems.

3.4.2 (NF) Data will be portable.

The game data files will be platform independent.

3.4.3 (NF) The system will be upgradeable.

The system will be upgradeable after installation. The code will follow the standard coding convention for the Java programming language and will be easy to read and easy to upgrade by an external party.

3.4.4 (NF) The system will not require regular maintenance.

Once installed, the game and data system will not need to be maintained at scheduled intervals.

3.5 Design Constraints

Analyzing the first requirement elicitation log and the RFP 1.0, LSS will assume the following design constraints.

3.5.1 (NF) Software development language

LSS will use different software languages during the prototyping, design and testing phases such as Prolog to generate test cases or ML to model some search algorithms. However, the deliverable software will be written in:

- Client software: Java on JRE 1.5 compatible.
- Admin module: Java on JRE 1.5 compatible.
- Database: Standard SQL.

3.5.2 (NF) Development tools

Different departments at LSS will use different development tools.

- In general, we will use Eclipse IDE for software development

UCSE's Educational Game System	Version: 1.0
Software Requirements Specification	Date: 03/02/06
LSS.Educational.Game.RS-1.0	

- Our build system is running on a Unix platform.
- Our tests will performed on Mac OS and Windows environments.

3.6 Online User Documentation and Help System Requirements

Online documentation will be available for the game upon completion and delivery. The game will also come with built in help files and tutorials for game play.

3.7 Interfaces

3.7.1 (F) User Interfaces

The first screen is the login screen. It will feature a username and password string entry, and submit and exit buttons. The user will be notified by a dialogue box in case of an incorrect entry.

Once the user has signed on, the main menu screen will be presented. The main menu will have three buttons: New Game; Load Game; and, Quit Game. All buttons in the preceding and subsequent menus will have a similar style: energetic, entertaining, but also easy to understand and use. The buttons will provide the following functionality:

- The function of any Quit Game button will be the closing of the game.
- The Load Game button will load the user to the position in the game they were before their last sign off.
- The New Game button will open the new game menu, where the character is selected. On this screen, there will be an image of whatever character is selected; as well as a scrolling method to switch characters, *and continue* and *back* buttons for progression through the menus.

Once a character is selected and *continue* is pressed, the user will choose his or her difficulty level and the game will commence.

The game-play screen will have one bar along the bottom. The style of the bar is dependent on what character was chosen by the user: one style for boys and one for girls. There will be three basic functions along the bottom bar: character, skills, and map.

- The character function will show the player their character at that point in time.
- The skills section will show the player what their skills are at the three main educational types: math, English, and problem solving.
- The map function will bring up a map of the game area, showing the player where they have been before, what areas they have completed the exercises or lessons in, and what the areas are in any direction from them.

A fourth in-game menu is accessed by pressing the ESC button. In this menu are some basic game-play options such as text scroll speed and text size, and the Quit Game button which exits the game, while also saving the current state of the game.

3.7.2 (NF) Hardware Interfaces

The gaming software does not require any additional or specialized hardware in order to operate. Existing hardware such a keyboard and mouse will be the only hardware required for input to the game.

3.7.3 (NF) Software Interfaces

The gaming, administration and database components of the software will communicate securely via a local network. All connections will be adequately encrypted, while still

UCSE's Educational Game System	Version: 1.0
Software Requirements Specification	Date: 03/02/06
LSS.Educational.Game.RS-1.0	

meeting the performance requirements (section 3.3)

3.8 Licensing Requirements

At this point, LSS believes that there is nothing to license. However, our sound engineer will work with your BA to see if there are any special background musicals or sound effects that need to be included in the game. In such a case, additional licensing might be required.

3.9 Legal, Copyright and Other Notices

Upon the release of the software, an EULA must be developed by UCSE to specify legal agreement between the user and UCSE. LSS will not be a liable party in this EULA or in any legal document regarding the use of the software. LSS will only be liable as a contractor to develop the software and will fulfill its legal requirements.

All software components that are part of the LSS existing software repository, and are used in the game will remain as LSS's intellectual property (IP). LSS reserves all rights concerning the use, distribution, and disclosure of such work. Works developed exclusively for this software will become UCSE's IP.

UCSE's Educational Game System	Version: 1.0
Software Requirements Specification	Date: 03/02/06
LSS.Educational.Game.RS-1.0	

4. Appendices

UCSE's_RFP1.0

UCSE's Educational Game System	Version: 1.0
Software Requirements Specification	Date: 03/02/06
LSS.Educational.Game.RS-1.0	

1.0 Problem description / expression of need

There is an ever-present need for alternative teaching tools in the elementary school system. As children are being exposed to computers at increasingly younger ages, the demand for effective and engaging educational software will continue to increase. Unfortunately, most currently available educational games simply cannot compete with most other forms of entertainment available to children today. These simplistic games often fail to grasp the attention of children when compared to most commercially available non-educational video games, movies, and television shows.

What is needed is a computer game designed to teach Grade 1 and 2 students basic math, English, and problem-solving skills that the children will actually enjoy playing – a game so appealing that kids will actually choose it over more conventional non-educational forms of entertainment.

2.0 Project Objectives

1. Teach grades 1 and 2 math, English and problem solving techniques
2. Expose kids to computer technology
3. Entertain and engage the attention of the students
4. Provide a way for teachers to track and evaluate student progress
5. Scaleable difficulty to fulfil the needs of individual students
6. Available for use at home
7. A user interface and controls that is simple enough for grades 1 and 2 (see constraints for more details)

3.0 Current System(s)

There are many commercially available educational games such as the Heartsoft Reading & Math SkillSet ¹. It is doubtful that any children would choose to play games like these when faced with alternatives like the Xbox 360, hundreds of TV channels, and multi-million dollar budget Hollywood blockbusters.

4.0 Intended users and their interaction with the system

Elementary school students in grades 1 and 2 should want to play this game. The students will find themselves so completely entertained that they will barely notice the educational aspects of the game.

Teachers of grades 1 and 2 will use the game to track development in individual students and as a possible marking guide. Teachers will also export relevant data for creating spreadsheets and graphs of individual and group performance.

Parents will use the game to track the development of their child/children at home in the same way as teachers do at school. Parents will also be installing the game on home computers.

5.0 Known interaction with other systems within or outside the client organization

Teachers and parents will want to export relevant data for creating spreadsheets and graphs of individual and group performance.

Compatible with office software (MS Office, Open office, etc)

6.0 Known constraints to development

Platform independence is necessary since each school may have a different OS.

Because a lot of schools are using older systems this game should run on a system with these requirements:

- Windows 95 and newer: Pentium 60, 16 MB ram, 80 MB HDD space, Mouse, SVGA video card, 2x, or better, speed CD-ROM, DirectX compatible sound card
- Mac OS 7.6 and up: 16 MB ram, 80 MB HDD space, Mouse, SVGA video card, 2x, or better, speed CD-ROM, Monitor Requires 640x480, 256 color

It will be necessary to test the game with children to insure it is entertaining and easy to use.