

BINUS INTERNATIONAL
UNIVERSITAS BINA NUSANTARA

Major Computer Science
Sarjana Komputer Thesis
Semester [Even] year 2008

**The Implementation of Educational Technology in
Game-based Learning: Assisting Toddlers in Reading**

Fanny Khioe 0800785266

Abstract

This thesis is about an implementation of an educational computer game to assist toddlers in reading first sight words.

It is widely known that children associate with fun and enjoyable activities better than homework and work books that strike more as a chore. Computer games are a growing entertainment industry that many researchers found have given some knowledge as well as invites game players to learn. It has been widely accepted that players learn from the computer games they play. The benefits most computer games give have attracted attention to educators as well as researchers. Although many games have been made, only a few attempted to mix education principles into the games. Amongst these few educational games, a small fraction is made to help children with an age range of 3-12 in many educational sections such as mathematics, science and language art. .

This thesis' implementation of an educational game would be grouped into the language section. It aims to combine educational principles into a game that has both flow and fun; in doing so, brings children to learn to multiple learning as well as improving concentration and prolonging children's attention span. Designed to fit the particular age range of 3-8 years old, the thesis must look at key behavioral of the targeted players and fit the written theories to a working educational game.

This thesis contains an educational game that assists toddlers in reading and procedures to installation manual. Surveys are conducted to view feedbacks received both from teachers and kindergarten children. Survey results are beneficial to not only add some insights to designing an educational game in the language art category but also to provide an opportunity for a future analysis report on learning style of children in response to the IT world today.

Keywords: educational computer game, survey, research, future analysis

ACKNOWLEDGEMENT

I would like to thank GOD for His blessing of strength, endurance, guidance, and wisdom throughout the development of this thesis. Without Him, this thesis would have never been completed.

I would also like to take this chance to express my gratitude, gratification and appreciation to those people who helped in the completion of this thesis:

My Family: My parents, siblings, especially my younger sister for always giving me support.

Ir. Yaya Heryadi, M.Sc, my supervisor, for his help, understanding, guidance and advices.

My friends:

-Kris Antoni for his help in character designs and drawings.

-Innestasia Tjahyadi for her help and constant support.

-Ms. Sofi, a kindergarten teacher, for her support, knowledge sharing and cooperation.

-Ms. Debri Pristinella, M.Sc, for her guidance and knowledge sharing.

And also to the entire staff of Universitas Bina Nusantara.

TABLE OF CONTENTS

ACKNOWLEDGEMENT	iv
TABLE OF CONTENTS	v
LIST OF FIGURES	ix
LIST OF TABLES	xiii
1 Chapter 1: Introduction	xv
1.1 Background	xv
1.2 Scope	xvi
1.3 Assumptions	xvii
1.4 Aimed benefits	xvii
1.5 Structure	xviii
2 Chapter 2: Theoretical Foundation	xx
2.1 Theoretical Foundation	xx
2.1.1 Theories of Education	xx
2.1.2 Theories of Child Development in Psychology	xxiv
2.1.3 Relation of digital game based learning with related theories	xxix
2.1.4 Other Theories of Games and Education	xxxviii
2.2 Theoretical Framework	xl
3 Chapter 3: Problem Analysis	xliii
3.1 Children' responses to educational practises	xliii
3.1.1 Why the 'short attention span'.	xliii

3.1.2	Motive – earn praise and avoid disapproval	xliv
3.2	Educational games’ results so far	xlvi
3.2.1	Current Games incorporated into school	xlvii
3.2.2	Results on the success of educational game	xlix
3.3	Proposed Solution	l
3.3.1	Brief introduction	li
4	Chapter 4: Solution Design	liii
4.1	Game Overview	liii
4.2	Game Features	liv
4.2.1	Game Manual, Rules and Limitation	lv
4.3	Application Design Overview	lix
4.3.1	Application Features and Overview	lix
4.4	Design and Architectural Diagrams	lxii
4.4.1	Context Flow Diagram	lxii
4.4.2	Detailed Data Flow Diagram	lxiii
4.4.3	System Flowchart	lxiv
4.5	System Data	lxv
4.5.1	Data Dictionary	lxv
4.5.2	Entity Relationship Diagram	lxx
4.6	Process Design	lxxiii
4.6.1	Use Case Diagrams	lxxiv
4.7	User Interface Design	lxxiv
4.7.1	Input Design	lxxv
4.7.2	Output Design	lxxxviii

5	Chapter 5: Testing and Implementation	xc
5.1	System Specification	xc
5.1.1	Macromedia Flash Professional 8.0	xc
5.1.2	PHP	xcii
5.1.3	MySQL	xcii
5.1.4	NaviCat for MySQL	xciii
5.2	Operational Procedures	xciii
5.2.1	Installation guides	xciii
5.3	Test Plan	cxxv
5.3.1	Functionality Testing	cxxv
5.3.2	Connection Testing	cxxx
6	Chapter 6: Evaluation	cxxxvi
6.1	Survey Statistics, Results and Purposes	cxxxvi
6.2	General Discussion	cxxxvii
6.3	Game play discussion	cxl
6.4	Level of difficulty discussion	cxlii
6.5	Functionality of teachers' site discussion	cxlv
6.6	User Interface discussion	cxlvii
6.7	Overall result and discussion	cxlix
7	Chapter 7: Conclusion & Recommendations	cliii
7.1	Conclusion	cliii
7.2	Future Recommendation	cliv

LIST OF FIGURES

Figure 1 – Application Process Layer.....	lx
Figure 2 - Context Flow Diagram.....	lxii
Figure 3 - Data Flow Diagram.....	lxiii
Figure 4 - System Flow Chart.....	lxiv
Figure 5 - Entity Relationship Diagram.....	lxx
Figure 6 – Use Case Diagram.....	lxxiv
Figure 7 - Start page.....	lxxvi
Figure 8 - First menu.....	lxxvii
Figure 9 - Virtual Keyboard.....	lxxvii
Figure 10 - Confirmation page.....	lxxviii
Figure 11 - Gender choice page.....	lxxix
Figure 12 - Players’ menu.....	lxxix
Figure 13 - Introduction of Tero.....	lxxx
Figure 14 - Tero shows his nest.....	lxxx
Figure 15 - Stage Menu.....	lxxxii
Figure 16 - Stage one.....	lxxxii
Figure 17 - Stage 2 menu.....	lxxxiii
Figure 18 - Stage two.....	lxxxiii
Figure 19 - Stage 3 Menu.....	lxxxiii
Figure 20 - Stage three.....	lxxxiv
Figure 21 - Correct answer.....	lxxxiv

Figure 22 - Wrong answer	lxxxv
Figure 23 - End of stage.....	lxxxv
Figure 24- Extra sticker page	lxxxvi
Figure 25 - teacher’s log in page.....	lxxxvii
Figure 26 - Sticker book	lxxxviii
Figure 27 - in sticker book	lxxxix
Figure 28 - View scores	xc
Figure 29 - Welcome page of Apache installation system	xcv
Figure 30 - Consent form.....	xcv
Figure 31 - Apache explanation.....	xcvi
Figure 32 - Server information screen	xcvii
Figure 33 - Setup selection screen	xcviii
Figure 34 - Custom setup.....	xcviii
Figure 35 - Changing the default installation folder.....	xcix
Figure 36 - Confirmation of custom setup.....	xcix
Figure 37 - Begin installation	c
Figure 38 - Installation is in progress	ci
Figure 39 - Finish installation	ci
Figure 40 - Testing the Apache program	cii
Figure 41 - Location of the ‘httpd.conf.txt’	ciii
Figure 42 - Content of ‘httpd.conf.txt’	ciii
Figure 43 - Searching the ‘documentroot’ word.....	civ
Figure 44 - Finding the ‘documentroot’ word	civ
Figure 45 - Finding the path of directory.....	cv

Figure 46 - Changing the location of the directory.....	cvi
Figure 47 - Find the matching text.....	cvii
Figure 48 - Change the directory to be the same as the ‘documentroot’ directory.....	cviii
Figure 49 - Placing the codes.....	cix
Figure 50 – localhost.....	cx
Figure 51 - Welcome screen of MySQL installation.....	cxii
Figure 52 - Setup type selection.....	cxii
Figure 53 - Starting the MySQL installation.....	cxiii
Figure 54 - Installation is in progress.....	cxiv
Figure 55 - MySQL explanation(i).....	cxiv
Figure 56 - MySQL explanation (ii).....	cxv
Figure 57 - Finish installation.....	cxv
Figure 58 - Starting MySQL configuration.....	cxvi
Figure 59 - Selecting configuration type.....	cxvii
Figure 60 - Selecting the server type.....	cxviii
Figure 61 - Selecting database type.....	cxix
Figure 62 - Selecting the location of the file.....	cxx
Figure 63 - Selecting the concurrent connections.....	cxxi
Figure 64 - Selecting network.....	cxxi
Figure 65 - Selecting character set.....	cxxii
Figure 66 - Selecting option for Windows.....	cxxii
Figure 67 - Selecting security option.....	cxxiii
Figure 68 - Executing configuration.....	cxxiv
Figure 69 - Finish MySQL installation.....	cxxiv

Figure 70 - PHP page trialcxxxix

Figure 71 – PHP Testing Result.....cxxxix

Figure 72 – MySQL Connection Test Resultcxli

LIST OF TABLES

Table 1 – Thesis structure	xix
Table 2 – Age 3-4 Psychology development: Physical & Neurological.....	xxvi
Table 3 – Age 3-4 Psychology development: Cognitive & Language	xxvi
Table 4 – Age 3-4 Psychology development: Emotional & Social	xxvi
Table 5 – Age 3-4 Psychology development: Identity & Moral.....	xxvii
Table 6 – Age 5-6 Psychology Development: Physical & Neurological.....	xxviii
Table 7 – Age 5-6 Psychology Development: Cognitive & Language.....	xxviii
Table 8 – Age 5-6 Psychology Development: Emotional & Social	xxix
Table 9 – Age 5-6 Psychology Development: Identity & Moral.....	xxix
Table 10 – Constructivist learning	xxx
Table 11 – Expected Kindergarten skills	xli
Table 12 – Factors of unimplemented computer games in schools	xlviii
Table 13 – Reasons to failure of educational computer games	xlix
Table 14 – Entity Relationship Diagram Data Dictionary	lxvi
Table 15 – Class Association and Multiplicity Notation	lxvii
Table 16 – Data Flow Diagram Data Dictionary	lxviii
Table 17 – Use Case Diagram Data Dictionary	lxviii
Table 18 – System Flow Chart Data Dictionary	lxix
Table 19 – Teacher Data Table	lxxi
Table 20 – Student Data Table.....	lxxi
Table 21 – Score Data Table.....	lxxii
Table 22 – Test Data Table.....	lxxii

Table 23 - UAT: User register/log in	cxxvii
Table 24 – UAT: Scoring Input system	cxxviii
Table 25 – UAT: Displaying Scores	cxxx
Table 26 – Tero Introduction	cxxxviii
Table 27 - Preference to method of learning.....	cxxxix
Table 28 - Students on games daily	cxxxix
Table 29 - Initial interest survey	cxl
Table 30 - stage one game play.....	cxli
Table 31 - Motivation level generated	cxlii
Table 32 - Stage 1 difficulty level.....	cxliii
Table 33 - Stage 2 difficulty level.....	cxliv
Table 34 - Stage 3 difficulty level.....	cxlv
Table 35 - User friendliness	cxlvi
Table 36 – Teacher’s site usefulness	cxlvi
Table 37 – Responds to graphics and animation.....	cxlvii
Table 38 – Responds to main character	cxlviii