Abstract
The rate of student’s boredom in study is increasing year by year. It seems that the student already bored with the traditional learning method that normally used by most of the school. In order to reduce the rate of student’s boredom this thesis is proposed an alternative learning method, using game-based learning. This game based learning will provide flexible features that will allow the user to learn as their journey in the game begin. To test the opportunities of game-based learning, one application prototype is developed: Phyplanet. The game is developed using macromedia flash 8 and powered with action script 2.0. Flexible features are provided in this game in order to keep the application meet the user expectation. In order to find the opportunities of acceptance, user testing is conducted for the students, teachers, public and parents. These tests will be able to identify the advantages and disadvantages of using game-based learning, and the also the acceptance rate from the target user. As the result, the thesis project has been able to meets the requirements, but yet the parents and public respond is not positive, there are some reason that make the public respond is against the implementation of game-based learning. And the effectivity of game-based learning also still questionable.
In conclusion, there are possibilities that game-based learning can be used as an alternative tools to study. Although, the parents and public respond is not positive, but in fact the students is love to study while playing. And there are a big possibility that the effectivity of game-based learning is higher than study using book.

Keywords
Game-based learning, Education Game, Macromedia Flash Game
Acknowledgments

First, I would like to thank the God that give me chance to work on this thesis and finish it. When I was written this thesis, many people are helping with support, advice, comments and knowledge. Then I would like to thank my supervisor Mr. Yaya Heryadi M.sc that gave me a lot of suggestion, advice and guidance. I would also like to thank my sister Glady Sefirina Sunjoyo, her friends and family, and her teachers who already helped me to test my application and give me feedback. Also for anyone who helped me during my thesis development, especially my parents, my friends, and all of my lecturer that give me knowledge that needed to build this thesis.
TABLE OF CONTENTS

Abstract........................................................................................................ iv
Acknowledgments......................................................................................... v
Table of Contents........................................................................................ vi
List of Tables............................................................................................... ix
List of Figures.............................................................................................. x

CHAPTER 1 INTRODUCTION...................................................... 1

1.1. Background......................................................................................... 1
1.2. Scope................................................................................................. 4
  1.2.1. Assumption............................................................................... 5
  1.2.2. Constraints............................................................................... 5
1.3. Aim and Benefit................................................................................ 5
1.4. Structure........................................................................................... 6

CHAPTER 2 THEORITICAL FOUNDATION......................... 8

2.1. Theoretical Foundation................................................................. 8
  2.1.1. Learning Process................................................................. 8
  2.1.2. Game-Based Learning....................................................... 19
  2.1.3. ADDIE Model................................................................. 25
  2.1.4. Game Mechanics........................................................... 27
2.2. Theoretical Framework.............................................................. 28
CHAPTER 3 PROBLEM ANALYSIS

3.1. Problem with Traditional Learning
3.2. Technological Learning
3.3. Analyze of Existing Problem

CHAPTER 4 SOLUTION DESIGN

4.1. The Game Design
4.2. The Game Flow
4.3. Win/Loss Condition
4.4. The Game Development Steps

CHAPTER 5 TESTING AND IMPLEMENTATION

5.1. Testing
5.2. Result

CHAPTER 6 EVALUATION

6.1. Testing Result Evaluation
6.2. Questionnaire Result

CHAPTER 7 CONCLUSION AND RECOMMENDATION

7.1 Conclusion
7.2 Future Recommendation
List of Tables

Table 2.1 Type of Learning and Type of Games........................................... 23
Table 5.1 Result of Phyplanet testing........................................................... 52
Table 5.2 Questionnaire Several Question Result....................................... 53
Table 6.1 Average Result from each category of Phyplanet testing............. 58
Table 6.2 Question no.1 Result................................................................. 61
Table 6.3 Question no.2 Result................................................................. 61
Table 6.4 Question no.3 Result................................................................. 62
Table 6.5 Question no.4 Result................................................................. 62
Table 6.6 Question no.5 Result................................................................. 63
Table 6.7 Question no.6 Result................................................................. 63
Table 6.8 Question no.7 Result................................................................. 64
Table 6.9 Question no.8 Result................................................................. 65
Table 6.10 Question no.9 Result............................................................... 66
Table 6.11 Question no.10 Result.............................................................. 66
**List of Figures**

Table: List of Figures

<table>
<thead>
<tr>
<th>Figure</th>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.1</td>
<td>Princeton University Learning Process</td>
<td>11</td>
</tr>
<tr>
<td>2.2</td>
<td>ADDIE Model of Software Development Methodology</td>
<td>25</td>
</tr>
<tr>
<td>2.3</td>
<td>Game Mechanics</td>
<td>27</td>
</tr>
<tr>
<td>2.4</td>
<td>Learning Retention Rates</td>
<td>29</td>
</tr>
<tr>
<td>2.5 (a)</td>
<td>Traditional Learning Model</td>
<td>30</td>
</tr>
<tr>
<td>2.5 (b)</td>
<td>Game-Based Learning Model</td>
<td>30</td>
</tr>
<tr>
<td>4.1</td>
<td>The PhyPlanet Games Mechanic</td>
<td>42</td>
</tr>
<tr>
<td>4.2</td>
<td>Main Menu Phyplanet</td>
<td>44</td>
</tr>
<tr>
<td>4.3</td>
<td>Main Character and Background</td>
<td>44</td>
</tr>
<tr>
<td>4.4 (a)</td>
<td>First Enemy</td>
<td>44</td>
</tr>
<tr>
<td>4.4 (b)</td>
<td>Second Enemy</td>
<td>44</td>
</tr>
<tr>
<td>4.5</td>
<td>Boss Stage</td>
<td>45</td>
</tr>
<tr>
<td>4.6</td>
<td>E Learning Session</td>
<td>45</td>
</tr>
<tr>
<td>4.7</td>
<td>Evaluation Session</td>
<td>45</td>
</tr>
<tr>
<td>6.1</td>
<td>Questionnaire No.1 Percentage Result</td>
<td>61</td>
</tr>
<tr>
<td>6.2</td>
<td>Questionnaire No.2 Percentage Result</td>
<td>61</td>
</tr>
<tr>
<td>6.3</td>
<td>Questionnaire No.3 Percentage Result</td>
<td>62</td>
</tr>
<tr>
<td>6.4</td>
<td>Questionnaire No.4 Percentage Result</td>
<td>63</td>
</tr>
<tr>
<td>6.5</td>
<td>Questionnaire No.5 Percentage Result</td>
<td>63</td>
</tr>
<tr>
<td>6.6</td>
<td>Questionnaire No.6 Percentage Result</td>
<td>64</td>
</tr>
<tr>
<td>6.7</td>
<td>Questionnaire No.7 Percentage Result</td>
<td>64</td>
</tr>
<tr>
<td>6.8</td>
<td>Questionnaire No.8 Percentage Result</td>
<td>65</td>
</tr>
<tr>
<td>6.9</td>
<td>Questionnaire No.9 Percentage Result</td>
<td>66</td>
</tr>
</tbody>
</table>
Figure 6.10 Questionnaire No.10 Percentage Result…………………………………….. 66