

FINDTHON: Game-based Python Learning For PT3 Students

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ABSTRACT

Python language has emerged as one of the most widely used programming nowadays. However, from previous researches and survey that has been conducted, it is found that some of the techniques on teaching Python programming language in school nowadays are not quite helpful and effective. Because of that, a game-based learning application is suitable to make the learning of Python programming language more engaging and fun to the students. There are several problems that leads to the idea of this project which includes, learning Python using traditional methods is not effective and not enough time to learn Python in class, also students in general had difficulty recalling Python syntaxes. The Game Development Life Cycle (GDLC) model is used as the development methodology where it includes six phases namely the Initiation phase, Pre-production, Production, Testing, Beta and Release phase. Game Based Learning (GBL) model is implemented in the design and development process to ensure the game developed has elements of learning and later can be used as a tool for learning Python. This application was built on mobile platform for Android that is the most widely used operating system and has open source feature which provides ubiquitous learning to the user. At the end of the project, the Game Based Learning application has been successfully developed. However, it can be further improved by adding features such as introducing multilingual function, adding scoreboard for keeping track of high scores and allowing multiplayer session for more enjoyable game and learning experience for students.

KEYWORDS: Python, Game-based Learning, Game Based Learning Design Model, Game Development Life Cycle, Functionality Testing

1 INTRODUCTION

FINDTHON is a mobile game-based learning application that can be used by PT3 students that consists of Form 1, Form 2 and Form 3 in secondary school. This application can help solve the problems that exerts the PT3 students in learning Python programming language by applying game elements that'll make the learning more engaging and fun to the students. Some of the problems that exists are learning Python using traditional methods is not effective and

not enough time to learn Python in class, also students in general had difficulty recalling Python syntaxes. The elements that has been implemented are based on the Game Based Learning (GBL) Design Model. FINDTHON has two sections, that is the learning part and the assessments part. Users are required to learn first in order to proceed to the assessments part. This application has some limitations which can be improved in the future such as available only in one mobile platform which is Android, uses single language which is Bahasa Malaysia for the main contents of the game, no sociality which means only single player and in offline mode and lastly no scoreboard for the assessments part.

2 OBJECTIVE

Identifying objectives is very crucial to keep track on what is needed to be achieved and as a general guideline for the system development. The objectives for this project are to design an educational game for PT3 students taking Computer Science in secondary school to learn basic Python programming language using game-based learning. Other than that, the objectives of this project is to develop a mobile game-based learning application game for the students to learn basic Python. Lastly, the objectives of this project is also to test the functionality of the mobile application game.

3 SIGNIFICANCE (S)

This project which is a game-based learning mobile application is important to the PT3 students in secondary school taking Computer Science to help them learn basic Python using a more fun and interactive way and also provides an alternative method which is a game concept for learning basic Python. As the students gain more interest in that certain subject, they tend to understand better and excel well in that subject. Other than that, this project is developed in mobile application platform so that students can also learn this subject outside of their class whenever and wherever they want to, so it doesn't just limit to the class and schedule of school. Hence, the students can access it easily and it's very flexible.

4 METHODOLOGY/TECHNIQUE

Game Development Life Cycle (GDLC) model is the methodology that is used to develop FINDTHON. Generally speaking, Game Development Life Cycle (GDLC) is iterative in nature and focuses primarily on creating a game that has good qualities [1]. Other than that, the Game Development Life Cycle (GDLC) is a guideline for the development of games [2]. GDLC is based on Software Development Life Cycle (SDLC), also known as software process model, which is the development strategy that includes the processes, methods and tools that are used to develop software [3]. The benefits of SDLC are therefore inherited in part from the GDLC model. GDLC is divided into six phases which are initiation, pre-production, production, testing, beta and release. Table 1 shows the methodology activities.

Furthermore, Game Based Learning (GBL) Design model is used for this project's development process, which is said to be suitable in developing a game-based learning application. The GBL Design model can implement all sorts of game elements such as repetition that would help in memorization, challenges in solving problems and also rewards that would surge motivation.model has been used. Fig. 1 shows the GBL Design model

Table 1 Methodology Activities

Phase	Activitis	Description
Initiation	<ul style="list-style-type: none"> Identify the problem statement and objective of the project. Conduct a survey towards Form Four students to gather information about PT3 Python programming. Conduct an interview with SMK Dang Anum Computer Science teacher who is teaching Python programming language. Identify the target user for Python programming. Summary of continuous research for related topics pertaining to project that is stated in Literature Review. 	<ul style="list-style-type: none"> Determine problem statements, objectives, scope and significances of project. Determine technique for development and literature review conducted on related topics pertaining to project
Pre-Production	<ul style="list-style-type: none"> Implement the GBL design model of the game. Designing use case diagram. Making navigational chart of the game. Designing the storyboard of the game. Design the Graphical User Interface (GUI). 	<ul style="list-style-type: none"> To design a mobile application game to teach students about Python programming language.
Production	<ul style="list-style-type: none"> Identify the hardware and software to develop the prototype. Develop the prototype of the game according to the design. 	<ul style="list-style-type: none"> Produce the game prototype based on game design.
Testing	<ul style="list-style-type: none"> Initiate alpha testing whereby the game is tested by own developer to test the functionality of the prototype. Identify flaws or defects. Correct bugs and debugging. 	<ul style="list-style-type: none"> Test the prototype for its functionality.
Beta	<ul style="list-style-type: none"> Initiate beta testing whereby the game is tested by target user to test the usability of the prototype. Get feedback and response from target user. Evaluate the results from usability testing. 	<ul style="list-style-type: none"> Feedback. Final documentation.
Release	<ul style="list-style-type: none"> Release the final developed game for user. 	<ul style="list-style-type: none"> Release

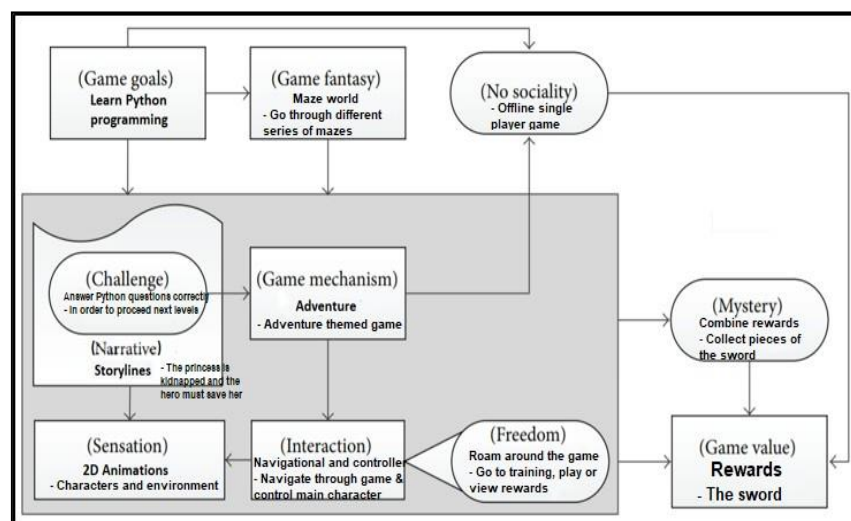


Fig. 1 GBL Design model

5 RESULT

Functionality testing focuses on simulating how users interact with the application. A test case is used to conduct the functionality testing in order to make the testing more detailed. The developer will check whether the functions are properly performing as expected. Once the function shows the expected result, the test case will be labeled as 'pass,' while the other 'fail' test cases will be repaired and tested again until 'pass' in another cycle. The test cases for the functionality test consists of Start and Exit Application, Open Settings, Open Info, View Training Levels, Selecting Training Levels, Play Training Levels (Learn Python), Read Python Notes, View Game Levels, Selecting Game Levels, Play Game (Play Game Levels), View Rewards, Adjust Volume, Display Info and Answer Python Questions. All function performs as intended at the end of the testing with all the status of these test cases are 'Pass'.

6 CONCLUSION

In conclusion, FINDTHON seems to have met the overall objectives of this project, which are to design and develop an educational game for PT3 students taking Computer Science in secondary school to learn basic Python programming language using game-based learning and to test the functionality of the mobile application game. However, there are several things that become the drawback factors but it can always be improved in the future to provide a usable teaching assistance to the students and also to other users who wants to learn basic Python programming.

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