CHAPTER 1. INTRODUCTION

1.1. Background

Novice programmer is a computer programmer who is not experienced at programming (Altadmri, 2015). They have many difficulties in the concept of program and construction program. A research conducted among novice programmer of programming courses has shown that motivation is one of the most important factors in successful finishing of programming courses (Konecki, 2014). Another surprising thing about the motivation of students in programming learning, 48% of students stated that they follow the learning programming because it is an obligation course that must be passed (Jenkins, 2001) and only 4.7% express enjoyment in following programming lectures. Obligation is one of extrinsic motivation. Extrinsic motivation is motivation which someone doing something because to get some expected result (Ryan & Deci, 2000), such as getting high test score, having new skills or passing exam.

Enjoyment is one of intrinsic motivation, which is the motivation of a person due to perform based on pleasure or challenge. For student it can be exemplified when student attend lectures because it is very comfortable with the material being taught, or feel fun when following the course. However, to increase intrinsic motivation, gamification in learning process can be used to reach this targets (Gabriel Barata, 2013). Gamification is a process of using game-design in a context that is not a game (Deterding & Dixon, 2011).

Many educators have tried, with many degrees of success, to effectively utilize gamification to increase student motivation and achievement in the classroom (Banfield & Wilkerson, 2014). Barata et al. (Gabriel Barata, 2013) presented a gamified course and discussed how gamification can be used to improve student engagement. Donovan (O'Donovan, 2013) had similar findings in his experiment, where their research has shown 88% of students agree that gamification can improves student engagement and understanding. However, the implementation of game design into learning system is still in debatable (Michael, 2006). The debate tends to focus more on issues such as high development costs, the complexity of integrating games into the curriculum and also or the need to assess the quality of the learning process. Most of the advantages of game-based learning in terms of motivation and engagement are lost and the learning experience suffer (Koster, 2004).

Most gamification on education implement one-size-fits-all when applied to course materials (Rapp, 2014). In gamification concept, basic knowledge of user or skill of user is

ignored, so all courses material will be given from start to finish. When using one-size-fits-all generally presents the same presentation of learning material for each user as it assumes that the characteristics of all users are homogeneous, whereas in reality each learner/student has different characteristics (Rapp, 2014). This causes what is learned does not match the characteristics of each student, so that what is obtained also becomes less optimal. In emerging educational systems technology, it is necessary to have a gamification system that is capable to accommodate the problem of different characteristics of students (in learning style, maturity level, background and level of knowledge, learning achievements and others). In other words, gamification should be adaptive.

Learning process is made into adaptive is to personalize the course to suit individual needs, by helping to improve their weak areas, and keep what they have learned and progress through the tracks at speeds and in directions that are uniquely suited to them (McGraw-Hill Education, 2017). In adaptive hypermedia method and technique, there is adaptive navigation support or link level adaptation (Brusilovsky, 2001). Adaptive navigation support can be implemented by using link hiding and direct guidance techniques. Use of link hiding and direct guidance can help students in determining what learning path will be chosen by the students according to the needs and abilities of the students (Brusilovsky, 2007). This is different from traditional e-learning, where every student is required to follow each theory after theory to master every topic (Posner, 2017). Based on the research said about 98% of students in the adaptive learning performed as well as the average students in the traditional learning (Posner, 2017).

Learning with gamification will increase the intrinsic motivation of students (Gabriel Barata, 2013), but the presentation of material that applies the concept of one-size-fits-all does not pay attention to the students' ability to make the learning process less optimal (Rapp, 2014). Adaptive navigation is needed for the learning process to be more optimal and in accordance with the needs of students (McGraw-Hill Education, 2017). From that research, the authors intend to make research on the application of gamification techniques using adaptive navigation, by taking cases of learning for novice programmers.

1.2. Research Questions

These research proposes adopting adaptive navigation support into gamification education system for novice programmer. it aims to solve the problem that can be stated as follow:

[RQ1] What kind of gamification that can enhance intrinsic motivation?

[RQ2] How to adopt adaptive navigation support into gamifications, so that learning processes become more efficient and learning materials needed can be delivered by each student according to their student's knowledge?

1.3. Objectives

The main objective of a learning process is to convey certain knowledge and skill from teacher or lecturer to student and ensuring that students are engaged and given clear feed back (Robert Wood Johnson Foundation, 2012). To make sure students have a great motivation, gamification can increase intrinsic motivation to students. The objectives of this research is to examine what kinds of gamification can be applied to the learning process, so that it can raise the intrinsic motivation students, and how to combine adaptive navigation support with gamification, so that the learning processes become more efficient each student according to their student's knowledge.

In the making game design for gamification, will notice what aspects should be considered to make learning for novice programmer. In designing adaptive navigation will be concerned about what learning topics should be there so that each student will receive the material as they need.

1.4. Hypothesis

The hypotheses of this research is using adaptive navigation into gamification can make the learning process more efficient (Posner, 2017) and will increase intrinsic motivation (O'Donovan, 2013). More efficient proof is by measuring how long it takes for each student to complete the materials they need. Proof of increasing intrinsic motivation can be done by take a survey of students about interest or not the learning process that has been done.

1.5. Research methodology

The step of research methodology used in this thesis are as follows:

a. Problem identification

   This stage aims to identify the background of the problem how solutions can be offered to solve the problem.

b. Literature review

   In this stage will be a search of literature on novice programmer, gamification and adaptive navigation support. At this stage also defining the application candidate, what topics will be given and how to determine the difficulty level of a problem and also the

description of adaptive navigation suitable for what kind of learning. It will also be done benchmarking with existing concepts or applications.

c. Model design

At this stage it is described the functional requirements and how the design will be implemented so that the objectives of the research can be achieved.

d. Data collection

Data collection is done to get the question bank of each predetermined topic and also how the technique to get the category of potential users from the level of ability.

e. Implementation and experiment

At this stage the implementation of the application and how the experiment can be proved in accordance with the hypothesis in section 1.4.

f. Testing result and analysis

At this stage will calculate how the comparison of the results of the ability of each student and how adaptive navigation can help optimize the completion of learning to be more efficient. At this stage also will know how gamification can increase intrinsic motivation.

1.6. Thesis Overview

This thesis is organized into 5 chapter consisting of: introduction, literature review, research methodology, implementation and experiment, and conclusions. Here's an explanation of each chapter:

a. Introduction

This chapter describes on the background of the problems that arise, the research question, objective that will reached, review of research methodology and thesis overview.

b. Literature review

This chapter discusses the theoretical foundations of concepts and theories that support and use in this thesis. The literature review refers to the theoretical basis used as a reference guide for the thesis.

c. Research Methodology

This chapter describes the general description of the proposed system and model for solving the problems in this thesis. In this design described the system overview both in terms of detailed system structure, proposed model, data flow, and system usage scheme.

d. Experiment and Analysis

   This chapter describes the purpose of testing and testing scenarios to solve the problems in this thesis. In the analysis phase of the test results, explained about the data derived from the test results, graph of test results and analysis.

e. Conclusions

   This chapter discusses the final conclusion of this thesis. Conclusions include the results of the final analysis that has been done and explain the answer to the problem statement formulated in this thesis. In the recommendations section, there are suggestions on the possibilities that can be developed from the results of this study.