Formative Assessment as a Learning Method for Introductory Programming

Jagadeeswaran Thangaraj*
School of Computing, Dublin City University, Ireland
Jagadeeswaran.Thangaraj@dcu.ie

ABSTRACT

Programming language courses are essential for learning software development and different activities are used to motivate novice students to help them to learn programming languages. Formative assessment is one of the approaches for effective programming learning. It can help them for increasing recall, facilitating engagement and reinforcing programming knowledge. This research aims to study whether the formative assessment builds self-confidence of novices to the learning of programming.

CCS CONCEPTS

• **Social and professional topics → Student assessment**.

KEYWORDS

Formative Assessment; Introductory Programming; Self-test Quizzes

1 INTRODUCTION

Computer programming is younger than other science subjects and teaching computer programming is still an emerging field. Researchers are finding different ways for effective teaching of programming and motivating novice students in programming modules are still in interventions. The recommended pedagogical approaches are pair programming, peer instructions, live coding, collaborative learning and assessment & feedback systems [1]. Formative assessment is one of the approaches for effective programming learning [3]. It is widely practised in educational institutions and proved that it is helpful to achieve the objective[2]. Inspired by this approach, we have designed the formative assessment quizzes for introductory programming modules and currently are researching how they are helpful.

2 RESEARCH GOAL

Research problem in assessment and feedback systems is that these systems fail to motivate the novices for learning programming skills. The goal of this research is to explore the formative assessment quizzes in terms of their ability scaffold and support novice programming students. This research aims to address the following research question: Does the formative assessment quizzes effectively help to build self-confidence of novices to the learning of programming?

3 CONTRIBUTION

In the case of programming modules, Multiple choice questions (MCQ) are not enough to assess the student's coding knowledge and it does not engage students to write their own code when they are at an advanced level. However, it can help for recalling the programming concept and motivating their engagement. Learning from errors is another effective approach of making students learn in programming [4]. It helps students to understand the frequent errors they make while coding and the error messages from the compiler. We have developed formative self test quizzes for introducing frequent errors in programming. In these quizzes, we have a list of questions with different choices. Each choice provides feedback when they attempt. These quizzes help to support their learning as they provide feedback for each choice. Students can learn from their wrong choices and find out the right answer. Therefore, it is a progressive method and helps them to learn from the errors.

4 METHODOLOGY

This research developed these quizzes for basic topics of introduction to programming on our Moodle VLE. We conducted these self-test quizzes at the end of each teaching session to build novice's confidence as well as to capture their barriers in programming. At the end of the course, we conducted a survey about how it effectively helped them to learn programming. This study found that this method worked well to build their self confidence. It also provided teachers with quick and accurate feedback of students' knowledge. Our future work will involve a study to investigate if adaptive based coding exercises produce effective results in program learning.

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