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City University of Hong Kong

Innovative Learning using Gamification to enhance Teaching and Learning Software Engineering

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Principal Investigator: Dr. Jacky KEUNG

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Abstract:

Gamification (or Virtual Gameful Experiences) is a new and perhaps under-explored concept in the context of modern play-based innovation learning, which promises a new way to motivate desired behaviors, and most importantly, allows learners to truly appreciate and enjoy the learning experience by considering themselves as a player in a game-like learning environment. The implementation of Gamification generally refers to the introduction of game design elements and enjoyable learning experiences in the design of learning processes.

Teaching and learning software engineering, software programming development is a complex activity that normally requires a group of students to work together, to ensure the software code is highly readable and compatible as measures of quality. However, there is a lack of effective ways to educate students on the importance of code readability, teamwork, and integration. The problem inspires this research study into building an engaging, interactive environment for novices (especially computer science and software engineering students) to learn coding quality, readability, and other important software engineering learning objectives.

This project aims to study the interactive game elements required to motivate student learning, the perceived student learning experience observed, and how Gamification could be further extended to other discovery-based interactive learning environments, in particularly useful during the current pandemic as such an interaction could be persisted in an online environment. Allowing students to truly enjoy and be able to compete (as in a game) with their fellow classmates, motivating their desire to learn and succeed. The impact of this research project could be largely observed by the penetration of the concept of gamification for the task-oriented, in-class learning environment, both in physical and online teaching and learning would be appropriate.

The deliverables of this project are not to be confused with a real video game for playing by students, it will be an online platform for students to submit their programming tasks, and as an online competition showing the leader boards and other performance indicators, motivating students to strive for a higher quality of coding tasks as required in the learning objectives. The research result will be important and useful for the future development of advanced Gamification theories for discovery-based interactive learning, this project includes dissemination of the experimental results and formulated blended learning framework utilizing Game Design Elements (GDEs) for designing interactive and innovative in-



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class learning modules to international journals for educational technology. The experiences and skills learned, and the methodology to identify important GDEs for interactive learning will be disseminated as a new body of knowledge in this area. Furthermore, the application of Gamification in real-world Software Engineering practice will be observed which is also directly relevant to CS3342 Software Design and CS3343 Software Engineering Practice, empirical results will be further disseminated in research publications. Ultimately, this is the first step towards a much bigger ambitious goal of Metaverse in Education.