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EXTENDED ABSTRACT

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Universiti Teknologi MARA Cawangan Melaka
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Horticulture Land: Master the Art of Gardening through Green Game

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***Abstract*— Planting and nurturing trees and plants as a part of horticulture is known as gardening. In today's tight economy, some people begin gardening to save money. Growing a garden can reduce expenses on groceries as it yields homegrown vegetables and fruits. However, limited gardening knowledge was the main barrier that stopped people from gardening. In addition, the traditional method of learning gardening fails to cultivate a sense of enjoyment and leads to discomfort, distraction, and disengagement. Therefore, we developed a *Horticulture Land* game that allows users to learn about gardening in risk-free and enjoyable ways by providing virtual gardening activities. The game follows the Game Development Life Cycle (GDLC) methodology, ensuring a systematic and effective development process. The development of *Horticulture Land* is based on the EGameFlow Model consists of seven elements: *Concentration, Goal Clarity, Feedback, Challenge, Autonomy, Immersion, and Knowledge Improvement.* In conclusion, *Horticulture Land* offers a unique opportunity to foster a deep and meaningful connection with the natural world. It challenges the perception of gaming as a solitary and sedentary activity by encouraging players to explore, learn and enjoy in a digital ecosystem.**

Keywords*— horticulture, green game, enjoyment, Game Development Life Cycle, EGameFlow Model

I. INTRODUCTION

The term "gardening" was probably first heard in kindergarten or elementary school. Gardening, according to the Cambridge dictionary, is the job or activity of working in a garden, growing and caring for plants, and keeping them attractive. Planting and nurturing trees and plants as a part of horticulture is known as gardening. In today's tight economy, some people start gardening to save money. Cultivating a garden has the potential to lower expenditures on groceries by producing homegrown vegetables and fruits [1]. People can choose their favourite vegetables or fruits for daily consumption without having to spend money because they are available in the garden.

Furthermore, the recent Covid-19 outbreak has affected the majority of countries, including Malaysia. The increased number of COVID-19 transmission cases prompted the decision to carry out the Movement Control Order (MCO) [2]. This scenario implies that going out to buy groceries is restricted. As a result of the COVID-19 pandemic, interest in gardening remains high. In the United States, the Covid pandemic resulted in 18.3 million new gardeners [3]. In Malaysia, many are entering the field of horticulture because of the COVID-19 pandemic and the Movement Control Order (MCO) [4].

However, mistakes tend to happen while gardening, particularly for those who are just starting. There will consistently be new things to discover that individuals unintentionally ignored, leading to moments of confusion about what went amiss. According to Bonnett [5], regardless of how long someone has been gardening, the majority of people believe they are taking good care of their plants when they make common mistakes. Bonnett [5] further said that people make mistakes with little research on their chosen plants.

Researching might not be exciting for everyone. People have to jump around different websites, reading one article after another, to get the info they want. However, it is important to keep up with the latest tech and trends in this fast-changing tech world. Learning should not be dull or only about memorizing by repeating it over and over. In today's world, using fancy technology is really important to make learning better. Video games are considered engaging media, which in itself could be a facilitating factor in the learning process [6]. As a result, this project proposes using game-based learning to make learning more enjoyable for gardeners and to promote accelerated learning. According to Pho & Dinscore [7], gamification and game-based learning have become really popular in different situations, like at work, in school and even on social media. Many people have experienced these game-like approaches in different situations, whether they realized it was happening or not. Having a mobile game that would teach the steps in gardening, from the very first step to the very last step, would make learning easier and more enjoyable.

II. OBJECTIVES

The project aims to design and develop a game-based learning application that enjoyably teaches about gardening. Game-based learning changes regular learning material into games, so learning happens while playing. The subsequent specific objectives must be attained to achieve the primary goal: 1) To design a storyboard about practicing gardening through game-based learning (GBL). 2) To develop a game-based learning application about a guide to being a plantsman. 3) To evaluate the enjoyment of using *Horticulture Land* in learning about gardening.

III. SIGNIFICANCE

The project aims to design and develop a game-based learning application that enjoyably teaches about gardening. Game-based learning changes regular learning material into games, so learning happens while playing. The subsequent specific objectives must be attained to achieve the primary goal: 1) To design a storyboard about practicing gardening through game-based learning (GBL). 2) To develop a game-based learning application about a guide to being a plantsman. 3) To evaluate the enjoyment of using *Horticulture Land* in learning about gardening.

This game application is especially beneficial for those who want to improve their gardening skills but find information or ways to improve daunting and stressful. Users can visualize the result of their efforts through games, which can be a powerful motivator.

Horticulture Land allows for flexibility regarding when and where learning can occur. This game application may be a good option for busy workers who want to learn gardening. It has the potential to provide gardeners with a convenient way to practice and improve their gardening skills without having to visit a physical garden space.

Moreover, *Horticulture Land* is a great tool for gardeners who want to improve their gardening abilities but are on a tight budget or do not have easy access to gardening supplies. The application can enable users to take charge of their own learning and personal development by offering a free and convenient way to learn about gardening. This could potentially create new opportunities for personal development.

Since there is always room for improvement and perfection is unattainable, learning gardening through games can be a viable alternative for acquiring skills and knowledge.

IV. METHODOLOGY

GDLC was used to develop this application because the GDLC's emphasis on practical learning aligns perfectly with the learning objectives of this project, fostering better comprehension and skill transfer for learners. Second, the iterative nature of the GDLC process ensures a high-quality, bug-free game, with rigorous testing and evaluation at each stage. This iterative approach enables the developer to incorporate user feedback and address any potential issues as they arise. Figure 1 shows the phases of the GDLC methodology.

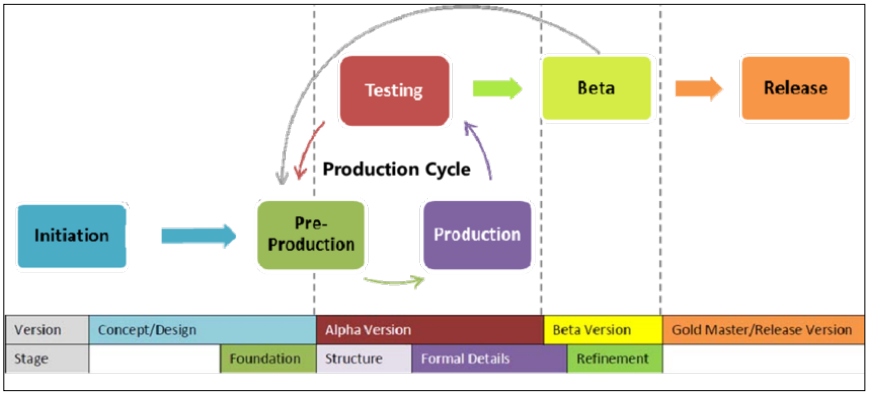

Figure 1 The phases of the GDLC methodology

Internal testing was carried out to ensure that the game worked properly. Internal testing is used to measure whether the user enjoys playing *Horticulture Land.* This was done during the testing phase based on the GDLC. The testing results in bug reports, change requests, and development decisions. The testing results will determine whether to move to the next phase (Beta) or reiterate the production cycle. The beta phase is performed by a tester outside the development team or a third-party tester called beta testing. The output of beta testing is bug reports and user feedback. Figure 2 shows some of the user interface for *Horticulture Land* that was designed throughout the production cycle.

Figure 2 Part of the user interface for Horticulture Land

The game application introduces players to virtual gardening, providing a unique platform for learning gardening techniques through interactive lessons. With three distinct lessons to choose from, players follow step-by-step instructions to complete various gardening tasks, enhancing their understanding of fundamental practices. This educational approach combines real-world gardening with virtual engagement, creating an engaging tool for acquiring essential gardening knowledge while incorporating gamification elements to boost enjoyment.

V. CONCLUSIONS

In conclusion, the *Horticulture Land* application is a remarkable venture into the world of 2D game-based learning, with a focus on the development of fundamental gardening skills. Utilizing the GDLC methodology, *Horticulture Land* has been developed and designed to educate and engage users in the art of gardening. This innovative approach not only makes learning gardening enjoyable but also cultivates essential skills, fostering a deeper connection with nature and promoting sustainable practices.

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