Mitosis Mastery: A Scratch-Based Approach to Enhance Learning in The KSSM Biology Syllabus

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ABSTRACT

"Mitosis Mastery" is a cutting-edge educational game that was created using prior research on gamification and game-based learning. The study's goal is to assess the game's ability to improve students' comprehension of Chapter 6, Cell Division in the KSSM Syllabus for Biology Form 4. This initiative focused on addressing the difficulty of effectively educating students on cell divisions in biology, a chapter that is widely recognized as one of the most challenging concepts to comprehend in the KSSM curriculum of biology, particularly in the Form 4 syllabus. Several studies have demonstrated that digital games are an effective means of enhancing student engagement and improving learning results. Utilizing these study findings, I created "Mitosis Mastery" as an engaging educational tool. "Mitosis Mastery" was created on the Scratch platform after a thorough examination of current research on gamification, game-based learning, and biology teaching. We have found some crucial factors that are recognized for their ability to improve learning outcomes, including interactive learning and immersive storytelling. It can be concluded that "Mitosis Mastery" is a valuable and pleasurable learning aid that offers teachers an engaging and innovative platform for enhancing their teaching activities. The game's interactive aspects create a dynamic learning environment that helps teachers effectively communicate complex topics to their learners and enhances their overall learning experience.

Keywords: *Cell division, KSSM syllabus, Scratch, Game-based learning, Difficult biology*

INTRODUCTION

Gamification is the application of game design elements and mechanics in non-game contexts to enhance engagement and motivation (Brigham, 2015; Marcusson, 2020; Ruggiero, 2013). Though not new, the concept has gained popularity due to the increasing presence of millennials in education and workplaces and the widespread use of smartphones and games (Brigham, 2015). Tracy et al. (2022) found that biology is a subject that often causes students to struggle. Creativity in biology education helps students connect different topics, evaluate ideas, and produce solutions to real problems (Diki, 2013). While most concepts are easy, cell division is widely recognized as a challenging topic for teachers and students in biology education (Öztap et al., 2003; Salleh et al., 2021). Therefore, we designed a game named "Mitosis Mastery" that acts as an interactive learning aid to assist students better comprehending the idea of Cell Division in Biology

METHODOLOGY

The creation process of Mitosis Mastery has been incorporated into the Malaysian KSSM Syllabus for Biology, with a special emphasis on the Cell Division chapter. The game was

envisioned as a strategic gaming experience on the user-friendly Scratch platform, coupled with educational tools that transcend traditional textbooks. These materials provide thorough notes and questions catered to learners of varied competence levels. Engaging elements such as guided gameplay instruction for simplified learning process and fun unlockable were introduced to promote user participation and enjoyment. Ongoing review and documentation of the development process assure the game's connection with educational objectives, establishing as a creative research-driven tool that offers an engaging way to learning Biology.

RESULTS AND DISCUSSION

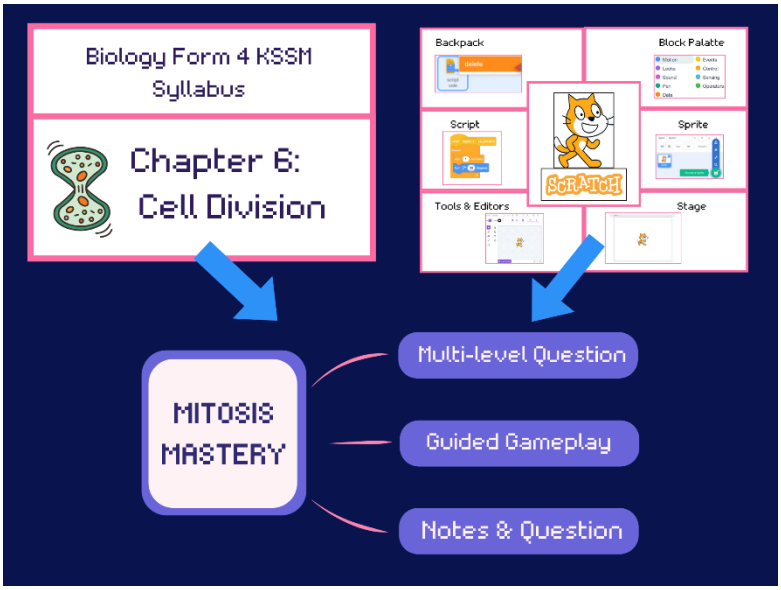

Figure 1. Mitosis Mastery

The result of developing educational tools like Mitosis Mastery is beyond a traditional book. Such a tool would provide students with a much more interactive learning experience than is possible with a traditional textbook. Guided gameplay instruction builds multi-level questions, further engaging users in the process of learning. The game development process is being reviewed and documented, so it would keep itself within the educational objectives to be a great tool for students to really see what biology is and how it works. Finally, Mitosis Mastery has that lovely mix of creativity and research, making it an effective educational tool for promoting the learning capabilities of students.

CONCLUSION

In summary, Mitosis Mastery offers a very different and more engaging way to learn biology than the traditional curriculum confined to a textbook. Structured gameplay instructions, multi-level questions, and detailed development process documentation significantly enhance this interactive learning journey for students. By turning educational content creative, Mitosis Mastery is a much stronger tool to help students understand and master biological concepts.

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