UNIVERSITI TEKNOLOGI MARA

KIDDOMATH: A GAMIFIED SMART LEARNING MATHEMATICS APPLICATION FOR EARLY CHILDHOOD EDUCATION

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ABSTRACT

Mathematics instruction in early education frequently utilizes passive methods, resulting in student disengagement and the cultivation of memorization without comprehension. KiddoMath is a solution to this problem. It is a mobile app that aims to improve math skills for children ages four to six. KiddoMath was developed using the Waterfall Model. Frontend development was done in Flutter and backend data management was performed using Supabase. A significant feature of the application is the use of a linear congruential generator (LCG) to develop problem sets that are unique for every session. This feature helps alleviate the issue of rote memorization, asstudents are required to repeatedly solve problems without the ability to recall the same problem set. User testing and the System Usability Scale (SUS) were conducted to evaluate the app's usability and functionality. Because of the age of the target users, parents were used as proxy respondents. The data analysis from these evaluations yielded an average SUS score of 74.38, which suggests the application is in the meaningful range, or 'Good'. The results further confirm the application is a viable solution for parents seeking a means to integrate meaningful engagement with positive cognitive development activities at home.

CHAPTER 1: INTRODUCTION

1.1 Background Study

The advances in mobile technology and digital educational tools have profoundly influenced early childhood education, particularly in teaching early childhood mathematics (Papadakis et al., 2021). The learning of mathematical concepts and skills seemingly at a young age sets in motion a chain of growth in cognitive development that can manifest in various ways, not just in a child's ability to do math but also in reading and higher-order thinking. Many preschools have traditionally used worksheets and rote memorization as methods of instruction, which can effectively preserve young children's attention for a short period.

Engaging children in educational activities can be accomplished using game-design elements like rewards and levels in non-game contexts. Research has shown that gamification is an effective way for educators to enhance student engagement by generating motivation and improving learning outcomes (Bharti, 2023). Gamification can make learning environments feel less like work and more like play. Badges, leaderboards, and point systems are utilized to motivate students, promote active engagement, and enhance the enjoyment of learning (Bharti, 2023). This encourages young students to interact with math naturally. However, platforms that are especially suited to children's developmental stages and place a focus on fundamental math skills are not available.

One significant advantage of mobile technology in maths education is its adaptive learning capability, which adjusts to each child's unique pace and understanding. Mobile apps provide dynamic difficulty adjustment based on child performance to create personalized learning environments which nurture self-learning activities. Students absorb learning differently when gamification comes into play because the system provides entertainment while delivering instant rewards to their screens and thus affects their motivation (Bharti, 2023).

Traditional early childhood mathematics teaching faces various problems which mobile technology intends to resolve. The traditional lecture-based approach in mathematics education now generates a standardized passive learning atmosphere which typically overlooks different learning styles and needs of students (Lee & Paul, 2023). It also relies on rote memorization and passive instruction, making learning less engaging for young children and limiting their