A GAMIFIED MODEL FOR CHILDREN'S ENGAGEMENT DESIGN OF COMMUNITY LEARNING APPLICATION

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FACULTY OF COMPUTING AND INFORMATICS
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I hereby declare that the material in this thesis is my own work except for certain quotations, equations, summaries, definitions, and references, which have been duly acknowledged.

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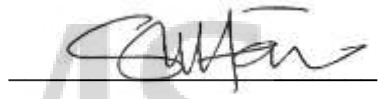

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ABSTRACT

There has been a lot of literature that claims gamification is all about learning, which leads to more research being done to see how gamification affects education. However, determining how effective gamification is in learning strategy is a difficult problem. This is due to a scarcity of long-term studies that systematically examine the impact of gamification interventions on student learning ability. It has been demonstrated that children can cultivate creativity through play. Games have also been shown to stimulate the mind while providing the education that people seek. As a result, it is not surprising that children at a young age are familiar with any medium of gaming. However, limited studies were found on children's engagement design. This research focuses on gamification in e-learning, particularly in early education; the 'what' and 'how' gamification can support e-learning in a community setting. Gamification has grown in popularity in recent years in the context of research in education and business marketing. Academics, educators, health management, employee engagement, civic engagement, and innovators have all expressed an interest in it. Gamification is a well-established practice and market segment. As a result of the lack of children's engagement in the learning process and motivation to learn, the incorporation of gamification has been recognized. The objectives of the study are to identify instruments, and guidelines and to develop a gamified model of children's engagement design of community learning application. This study adapted the Theory of Planned Behavior and The Gamified Learning Theory an underpinning theory on gamification's impact on behavior and engagement improvement. The method of data collection used was mixed methods. A prototype application was developed for the purpose of collecting data and the data was analyzed using statistical methods. The result from the hypotheses testing supports the model proposed where emotions and social have significant relations towards children's engagement. This study contributes a new instrument, guideline and a new model for children's engagement design of community learning application. The contribution from the study is hoped to be useful for future the evaluation, design, and development of gamified community learning applications for children.

ABSTRAK

MODEL GAMIFIKASI UNTUK REKA BENTUK PENGLIBATAN KANAK-KANAK BAGI APLIKASI PEMBELAJARAN KOMUNITI

Kebanyakkan literatur mendakwa gamifikasi adalah mengenai pembelajaran sebagai teras mereka yang membawa kepada lebih banyak kajian yang dijalankan untuk melihat kesan gamifikasi terhadap pendidikan. Walau bagaimanapun, penilaian tentang keberkesanan gamifikasi dalam strategi pembelajaran adalah masalah yang sukar. Ini disebabkan oleh kekurangan kajian jangka panjang yang menganalisis secara sistematik dan kesan intervensi gamifikasi terhadap keupayaan pembelajaran pelajar. Melalui permainan; terbukti kanak-kanak boleh memupuk kreativiti. Permainan juga telah terbukti mampu merangsang minda serta memberikan pendidikan yang dicari. Oleh itu, tidak hairanlah kanak-kanak pada usia yang sangat muda sudah biasa dengan pelbagai medium permainan. Namun begitu, kajian dalam gamifikasi pembelajaran kanak – kanak masih terhad. Kajian ini memfokuskan kepada gamifikasi dalam e-pembelajaran, terutamanya dalam pendidikan awal; dari bagaimana gamifikasi dapat menyokong e-pembelajaran dalam konteks komuniti. Gamifikasi telah meraih populariti sejak beberapa tahun kebelakangan ini dalam pelbagai bidang termasuk Pendidikan. Penggunaan gamifikasi untuk menyokong pembelajaran turut diakui. Objektif kajian ini adalah untuk mengenal pasti instrumen, garis panduan dan pembangunan model gamifikasi bagi applikasi pembelajaran kanak-kanak. Kajian ini mengadaptasi 'Theory of Planned Behavior' dan 'The Gamified Learning Theory' sebagai teori asas bagi mengaitkan kesan gamifikasi ke arah tingkah laku dan peningkatan penglibatan dalam pembelajaran. Kaedah pengumpulan data yang digunakan adalah kaedah campuran. Aplikasi prototaip telah dibangunkan untuk tujuan pengumpulan data dan data telah dianalisis menggunakan kaedah statistik. Keputusan daripada analisa ujian hipotesis menyokong pembentukan model kajian dimana terbukti bahawa konstruk emosi dan sosial memberikan kesan kepada tahap konsentrasi pada kanak kanak. Kajian ini menyumbang instrumen baru, garis panduan dan model baru untuk reka bentuk penglibatan kanak-kanak aplikasi pembelajaran masyarakat. Hasil sumbangan kajian ini diharapkan berguna untuk penyelidikan masa depan dalam pembangunan aplikasi pembelajaran komuniti menggunakan gamifikasi untuk kanak - kanak.

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LIST OF SYMBOLS

f^2	-	Effect Size
Q^2	-	Stone-Geisser
R^2	-	R-squared or known as coefficient of determination

LIST OF ABBREVIATION

AEQ	-	Achievement Emotions Questionnaire
EEQ	-	Exergame Enjoyment Questionnaire
IEQ	-	Immersion Engagement Questionnaire
ICT	-	Information and Communication Technology
GEQ	-	Game Engagement Questionnaire
SEM	-	Structural Equation Modelling
SPSGQ	-	Social Presence in Gaming Questionnaire
PLS-SEM	-	Partial Least Square Equation Modelling

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CHAPTER 1

INTRODUCTION

1.1 Introduction

The purpose of the research is to study the gamification model for children in community learning. The focus of this study is to investigate gamification in e-learning, especially in early education; the 'what' and 'how' gamification can support e-learning. Gamification has taken someone popularity in the past few years of research not only in the context of education but also in business marketing. Seaborn and Fels (2015) stated the idea of incorporating gamification has been acknowledged in business and marketing, it has also gained interest from academics, educators, health management, employee engagement, civic engagement as well as innovation.

Austrian philosopher Ludwig Wittgenstein was one of the first who tried to formalize and made systematic gamification – Philosophical Investigation 1958, he was known for famously using games as an example to illustrate the inadequacy of language for defining abstract concepts. Which has opened more research studies in the field of gamification which led to much aggressive learning process (Wittgenstein, 1958).

Past studies have noted that in terms of gamification application contexts, one size does not fit all. This means different domains require different ways of incorporating gamification to ensure that it's relevant to the domain or level of users or participants that using the gamified application. Meaning to say individual differences must be taken into consideration (Deterding, 2015). In addition, Arnab *et al.* (2015) mentioned that we are only in the beginning of understanding what gamification design elements and methods best map onto what application domains.

To assess how relevant or fulfilling participants anticipated to be before using a gamified application, Landers and Armstrong (2015) assessed students on materials with PowerPoint versus gamified instructions. The findings indicate that the effects are somewhat related to the attitudes and experiences of the individuals. Gamification benefits participants who had previous gaming experience and a good attitude, whereas individuals with less gaming experience and a negative attitude anticipated more benefits from traditional training.

Another classic example of how gamification is changing the way education was researched by Fitz-Walter *et al.* (2017). The study created a gamified logbook application for driving school students to record their driving hours, and the study has shown that applying gamification in a classic scenario makes otherwise a boring task of recording driving hours more engaging and enjoyable compared to a manual logbook without changing any of the students' behavior (Fitz-Walter *et al.,* 2017).

There have been many literatures that claim gamification is about learning at its core (Isbister *et al.,* 2010) which leads to more studies being conducted to see the effect of gamification on education. However, the assessment of how effective gamification is in learning strategy is a hard problem. This is due to lacking long terms studies that systematically analyze and effect of gamification interventions on student learning ability.

According to McGonigal (2011), through game; it is proven that children can cultivate creativity. Games have also proven to be able to stimulate the mind while providing the education one seeks. Therefore, it is no surprise that children at a very young age are familiar with any medium of games (Lenhart *et al.,* 2008).

1.2 Problem Background

In this era, technology is rapidly evolving with many innovations and creations being produced at a rapid pace. This can be seen in how tech companies and brands continue to release new tech products every year. Application software is one of the

most popular tech products. The majority of people use application software because it assists us in accomplishing our daily tasks. As each application software provides specific functions for personal, business, and educational purposes, there are currently many applications software that can be used by many people from various backgrounds and ages.

The world of education has been significantly impacted by economic growth and technology. A cynic would assert that technology has had little impact on schooling. Students must still attend class, teachers must still deliver lectures, and will still observe the same behaviors from students in class, such as talking to friends, dozing off, or simply daydreaming.

Although the fundamentals of what students traditionally learn in a classroom remain the same, technology has significantly changed how teaching and learning are done both inside and outside the classroom. Examples include digital learning tools, extended classes, lecture recordings, and a wide range of other learning tools that are available 24 hours a day, 7 days a week.

Nowadays there are multiple learning platforms apart from the classroom alone. The classroom, the web, computer applications, and mobile applications are now integral parts of education. It permits individualized learning, where students can pursue self-directed learning or learn at their own pace. The use of computers and other educational resources can promote social connection as well as learning. In addition to e-learning, technology has now made mobile learning possible, and it has become very popular (Sharrab *et al.,* 2013).

Having stated that, motivation will have a significant impact on the quality of teaching and students' involvement in the educational platform. Olson (1997) noted that "location, location, location" is likely to change to "motivation, motivation, motivation" because it is now a critical element that teachers may focus on to enhance learning. Figure 1.1 displays the amount of time spent each week in the UK by age group on media (UK).

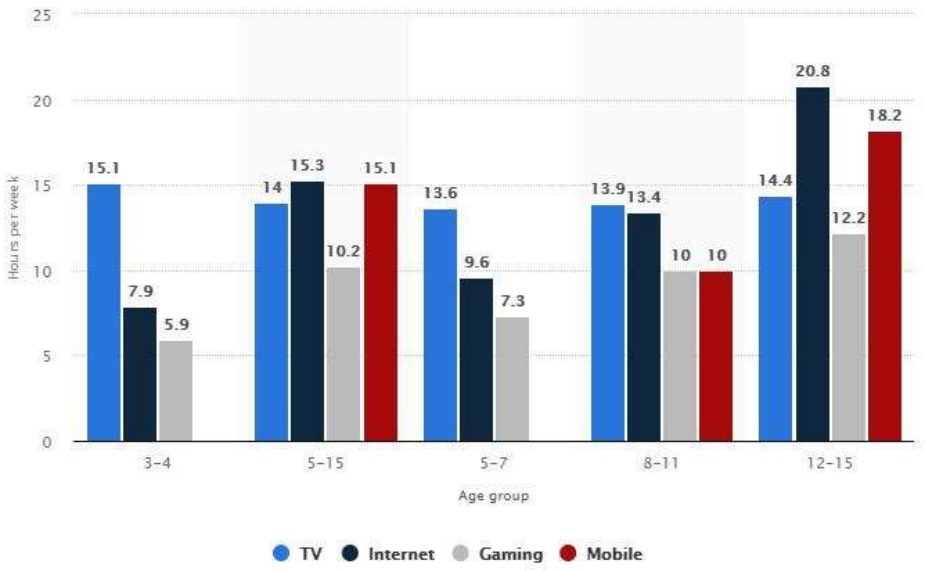

Figure 1.1 : Time Spent on Media Per-Week According to Age Group in UK

Source : Statisca

Based on Figure 1.1, Statistica recently published research on the amount of time children in the UK spend using various media, according to their age. Children between the ages of 3 and 4 played video games for an average of 5.9 hours per week. Naturally, older youngsters spend more time playing video games—kids between the ages of 12 and 15 averaged 12.2 hours per week. Little children are incredibly imaginative; they enjoy exploring, trying new things, and daydreaming. Playing video games can provide all of this. Due to the popularity of games among kids, educators have begun gamifying (or adding gaming features to non-gaming environments) in the field of education. Gamification is defined as "the application of game design principles in none game contexts," which distinguishes it from a serious game (full-fledged game). In the last couple of years, gamification have been strongly harnessed for purposes of marketing, attitude change, and motivational pull.

The domain of study is specifically for community learning which refers to the instructional and structured method of culture study in the community, such as language, history, and cultural heritage. In Sabah we have at least 42 ethnics group with over 200 sub-ethnic groups with their own language, culture and beliefs

which are predicted to increase more in the future. Studies in this area are very limited hence strengthening the purpose of conducting this study. Various gamification models have been proposed to increase the motivation of learners as reported by many types of research. However, the research on the study of gamified community learning application is limited and close to none.

1.3 Problem Statement

The purpose of this research is to tackle issues in children engagement in learning due to the problems specified in 1.3.1 and 1.3.2.

1.3.1 Difficult to engage with children in the current learning environment.

The most crucial element that educators can work on to improve learning is certainly motivation. Motivation has been the subject of numerous theories. What is the most effective technique to inspire students? Williams (2011) asserts that the five main factors influencing student motivation are the following: student, instructor, content, method/process, and environment. Cornell (2004) stated that 40% to 60% of students in the US will become chronically disengaged from school regardless of where they live (urban, suburban or rural). Supported by Geertshuis *et al.* (2014), this happens elsewhere too in other parts of the world. In addition, declining respect for authority and institutions among students, unable to comply with rules, authority, and academics (Frederick *et al.*, 2004; Modell & Elder, 2002; Janowitz, 1978).

When the Covid-19 pandemic started happening in 2020, most schools were shut down from the end of March 2020 until further notice by the government for safety reasons. The situation requires schools to continue the teaching and learning process remotely from home. Online teaching and learning from home can be difficult as educators are not able to teach physically which makes it harder for students to engage in the learning activities.

Educators had to consider what online tools to use according to their student's developmental level, which are appropriate, and which can promote children's participation and learning (Kim, 2020). Just using live video calls and presentation slides for teaching is not enough for children since they need more hands-on learning which can be hard to do remotely without proper guidance from the educator. Some students who are not good with the open and distance learning (ODL) style eventually lost motivation as well as lack of attention span to keep up with schoolwork at home as there are other things they can do at home (Garbe *et al.,* 2020). It is necessary to recognize that children engage in a variety of ways.

After almost a year of living with Covid-19, schools slowly begin to reopen where children can attend classes physically. However, it is still hard for some students to transition from online learning at home to physical learning in the classroom. Being used to online learning digital tools such as Google Classroom and Quizizz, they will encounter these digital tools less since educators will use them less when teaching face-to-face. Furthermore, with some of the educational application software being gamified, children will find learning in the classroom less interesting without the use of gamified application software. Children by nature love playing and enjoy being with friends. Gamified applications help children to enjoy learning better.

1.3.2 Limited study on gamified model of children's engagement design of community learning application

Community learning provides the indigenous people learning opportunity where traditional learning methods are inaccessible or ineffective, or due to being geographically dispersed. Whereas the community learning application is an online platform or software program that facilitates knowledge exchange and learning within the community. This includes the culture, skills, or native language that specific to the needs of the indigenous community.

Early childhood is when the brain is developing, which might provide the groundwork for future learning. The Harvard Center on the Developing Child's