UNIVERSITI PUTRA MALAYSIA

USE OF GAMIFIED AUGMENTED REALITY APP IN CREATING INTEREST IN LEARNING ENGLISH AMONG VOCATIONAL COLLEGE STUDENTS

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By

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Abstract of thesis presented to the Senate of Universiti Putra Malaysia in fulfilment of the requirement for the degree of Doctor of Philosophy

USE OF GAMIFIED AUGMENTED REALITY APP IN CREATING INTEREST IN LEARNING ENGLISH AMONG VOCATIONAL COLLEGE STUDENTS

By

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February 2022

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With the advent of the Fourth Industrial Revolution, forms of gamification are constantly changing. Overlaying virtual elements such as Augmented Reality (AR) brings a whole new digital learning experience for students. The use of gamification and AR technology has proven effective in enhancing interest, an element that has long been considered crucial for students' learning and personal development. The focus of this qualitative case study is on the use of a gamified augmented reality app named XploreRAFE+ in the formation of interest in English learning among vocational college students in China. The research questions that drive this study are: 1. What is the process of interest formation and its relevant influencing factors among vocational college students in a gamified AR environment? 2. How does a gamified AR environment trigger students' interest in English language learning? 3. How does a gamified AR environment immerse students in English language learning? 4. How does a gamified AR environment extend students' learning experience? To answer these questions, data were collected from thirty-eight vocational college students via observation, interviews and document analysis over the course of one month. This study found that a gamified AR environment constructed through the use of the XploreRAFE+ app could create a meaningful learning environment. In such an environment, the process of the interest formation is a dynamic loop that includes piquing curiosity, experiencing optimal learning experience, and perceiving meaningfulness. Furthermore, its use raised students' interest to learn English by fostering autonomy, competence, and relatedness with real life experience, all of which resonate with the main psychological need for intrinsic motivation. The use of the gamified AR app could also boost students' confidence and improve their English learning experience. These findings have significant implications for theory and practice. The findings of the study are beneficial to teachers, vocational colleges, the Ministry of Education, researchers, instructional designers, and theory development.

Abstrak tesis yang dikemukakan kepada Senat Universiti Putra Malaysia
sebagai memenuhi keperluan untuk ijazah Doktor Falsafah

**PENGGUNAAN APLIKASI GAMIFIKASI REALITI TERIMBUH BAGI
PEMBENTUKAN MINAT DALAM PEMBELAJARAN BAHASA INGGERIS
DALAM KALANGAN PELAJAR KOLEJ VOKASIONAL**

Oleh

WANG DAN

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Kepesatan Revolusi Perindustrian Keempat sentiasa menyebabkan perubahan
di dalam bidang gamifikasi. Gabung jalin elemen maya seperti realiti terimbuh di
dalam pendidikan telah membawa pengalaman pembelajaran digital yang
baharu kepada pelajar. Penggunaan gabungan teknologi gamifikasi dan realiti
terimbuh telah terbukti keberkesanannya dalam meningkatkan minat seseorang.
Ia juga dianggap sebagai elemen yang penting untuk pembelajaran dan
pembangunan sahsiah seseorang pelajar. Kajian kes kualitatif ini memberi fokus
kepada penggunaan aplikasi realiti terimbuh gamifikasi yang dipanggil
XploreRAFE+ untuk membentuk minat dalam kalangan pelajar Kolej Vokasional
di negara China. Persoalan kajian yang mendorong penyelidikan ini adalah: 1.
Apakah proses pembentukan minat dan faktor-faktor yang mempengaruhi minat
pelajar Kolej Vokasional dalam persekitaran pembelajaran berasaskan
gamifikasi dan realiti terimbuh? 2. Bagaimanakah persekitaran gamifikasi AR
dapat merangsang minat pelajar dalam pembelajaran Bahasa Inggeris (jika ada)?
3. Bagaimanakah persekitaran pembelajaran berasaskan gamifikasi dan realiti
terimbuh membantu penghayatan pelajar dalam pembelajaran Bahasa Inggeris
(jika ada)? 4. Bagaimanakah persekitaran pembelajaran berasaskan gamifikasi
dan realiti terimbuh dapat meningkatkan pengalaman pembelajaran seseorang
pelajar (jika ada)? Untuk mendapat jawapan bagi persoalan ini, kami telah
mengumpul data daripada 38 pelajar yang sedang mengikuti pengajian di
sebuah Kolej Vokasional melalui kaedah pemerhatian, temu bual dan analisis
dokumen selama sebulan. Kajian ini telah mendapati bahawa persekitaran
pembelajaran berasaskan gamifikasi dan realiti terimbuh yang dicapai melalui
penggunaan aplikasi XploreRAFE+ dapat mewujudkan persekitaran
pembelajaran yang lebih bermakna. Di dalam persekitaran yang sedemikian,
pembentukan minat berlaku melalui proses yang menyerupai gelung dinamik
yang terdiri daripada tiga fasa utama iaitu, terdorong oleh rasa ingin tahu,
mengalami pengalaman pembelajaran yang optimum, dan berupaya untuk

membina persepsi yang lebih bermakna. Selain itu, penggunaannya telah meningkatkan minat pelajaruntuk mempelajari Bahasa Inggeris secara pemupukan autonomi, kebolehupayaan dan pengalaman kehidupan sebenar. Perkara ini secara tidak langsung berkait dengan keperluan psikologi khususnya motivasi intrinsik. Penggunaan aplikasi gamifikasi realiti terimbuh dapat menambah keyakinan meningkatkan pengalaman pembelajaran Bahasa Inggeris. Penemuan kajian ini mempunyai implikasi penting terhadap teori dan amalan. Antaranya, hasil penyelidikan ini dapat memberikan manfaat kepada guru, kolej vokasional, Kementerian Pendidikan, penyelidik, pereka bentuk pengajaran dan perkembangan teori.

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This thesis was submitted to the Senate of the Universiti Putra Malaysia and has been accepted as fulfilment of the requirement for the degree of Doctor of Philosophy. The members of the Supervisory Committee were as follows:

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CHAPTER 1

INTRODUCTION

1.1 Background of the Study

Vocational colleges, commonly known as trade colleges or trade schools in the western countries, are an important part of higher education in China (Lian & Zhao, 2021). These institutions cater to the educational needs of students whose academic attainment is relatively lower compared to that of students in undergraduate colleges. The teaching methods of vocational colleges are generally considered as being outdated (Hao, 2014; Zuo, 2019). Students in vocational colleges in China generally have weak learning motivation and lack interest in learning (Hao & Hu, 2014). It was reported that nearly 40% of students in a vocational college had moderate or higher levels of learning burnout (Zuo, 2019). Interest in a particular subject is one of the strongest motivations for studying it, and so interest has long been considered one of the primary factors influencing the learning process (Amjah, 2014). Deng (2019) highlighted that it is imperative for Chinese vocational college teachers to innovate their teaching strategies so as to enhance students' learning interest; teachers should also encourage active participation in learning activities. However, the adoption of innovative teaching methods to enhance students' interest in learning requires a deep understanding of how these teaching methods promote students' interest in learning.

Emerging contemporary approaches to learning such as gamification have been receiving increased attention in recent years (Alomari, Ai-Samarraie &Yousef, 2019). Gamification integrates game mechanics into the learning design to create an engaging and fun learning atmosphere; it can also combine all kinds of tech gadgets to make learning activities more attractive (Subhash & Cudney, 2018). Competition is among the characteristics of gamification; it stimulates students' interest and participation in the learning process (Kim, Rothrock & Freivalds, 2016). Students beat rivals, become winners, and contribute their efforts to their team. The most commonly utilized techniques in higher education are points, badges, levels, and leaderboards (Alomari, Ai-Samarraie & Yousef, 2019).

Past studies have proven that gamification, an innovative learning design compared to traditional education methods, does foster engagement, curiosity and motivation, social interaction, and knowledge acquisition (Poondej & Lerdpornkulrat, 2020; Sailer & Sailer, 2021). Students who participate in gamified learning activities feel that such activities are of significance and are, therefore, self-motivated to perform accordingly (Sartini, 2020). Basically, gamification exploits the motivational power of games (Sailer, Hense, Mayr & Mandl, 2017). With rapid developments of information technology and the

upsurge of educational informatization, forms of gamification are constantly changing, and overlaying virtual elements such as Augmented Reality (AR) brings a new digital learning experience for learners.

AR technology makes it possible to present the real world with virtual objects superimposed upon it, or composited with the real world (Azuma, 1997). It has three characteristics, namely combining virtual objects with the real world, having real-time interaction with the users, and registering in a 3D space (Azuma, 1997). These features offer unique affordances that users can interact with without replacing the real world they are experiencing as virtual information is superimposed on the real world (Kesim & Ozarslan, 2012). Past studies have shown that AR technology can combine vivid animation, virtual characters, sound and other forms of virtual materials to construct a realistic learning environment, thus effectively enhancing learning motivation (Liu, Tan & Chu, 2008; Solak & Cakir, 2015). Moreover, as AR technology is capable of incorporating interaction functions, there are more opportunities for students to be engaged in learning activities (Wang, 2017). AR technology can attract students to interact with a realistic environment, previously considered an impossible learning approach (Billinghurst, 2002). A report by America Technology Virtual and Augmented Reality (VR/AR) points out that "AR technology has the potential to be a standard tool in education and could revolutionize the way in which students are taught for both the K-12 segment and higher education including colleges and beyond" (Goldman Sachs, 2016, p. 25).

Gamification has been proven as one of the most significant applications of AR technology in teaching (Bicen & Bal, 2016). AR technology can effectively combine forms of gamification to construct an attractive learning environment (Faisal, 2017). AR technology's gamification learning approaches have been widely applied in different disciplines (Bicen & Bal, 2016; Delello, 2014). Past studies have showed that gamification, coupled with AR technology, can construct an attractive learning environment to enhance student learning interest (Bicen & Bal, 2016; Faisal, 2017). The valuable aspects of AR and gamification in learning and teaching have been highlighted in several studies (Faisal, 2017; Mesut & Katrin, 2020).

The distinct advantage of gamification and AR technology, namely enhancing learning interest, has received significant attention in vocational colleges in China (Zuo, 2019). In a technology-supported learning environment, students' interest should be triggered; subsequently the students would get immersed in the learning process and their interest would be extended to new learning (Chan et al., 2018). Moreover, when learning interest is fostered, vocational college students might get better development; the teaching quality in higher vocational education colleges and the social reputation of vocational colleges might subsequently be perceived more positively (Zuo, 2019).

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Although the benefits of gamification and AR technologies have been well-documented, the reality is that there is a lack of in-depth investigation and understanding of how gamified AR leads to the formation of students' interest in learning (Liu, 2019). Although the recent development pace of gamification in China has been impressive, the application of AR technology, listed as one of the emerging technologies in the Fourth Industrial Revolution (Moro, Štromberga, Raikos & Stirling, 2017; Wang, 2017), remains rather superficial in vocational colleges in China, both in theory and practice in (He, Wang & Zhang, 2018). While there are studies supporting the benefits of gamification and AR in education, the understanding of the combination of both gamification and AR in fostering interest formation is rather vague.

Nevertheless, with the advent of the Fourth Industrial Revolution, the Education Informatization 2.0 Action Plan issued by China's Ministry of Education emphasizes that China will intensify development of intelligent education and relevant technologies (such as AR technology), reconstruct new learning environments, change college learning styles, and strengthen the application of theoretical research of relevant technologies in the educational field so as to achieve the goal of educational modernization (Ministry of Education of the People's Republic of China, 2018). One of the ways to achieve this goal is through the integration of immersive technologies such as gamified AR mobile apps in lessons conducted at vocational colleges. The integration of this technology opens up opportunities for educators to explore and have an in-depth understanding of how the application of gamified AR enhances learning interest, how it triggers learning interest, how students get immersed in the learning process, and how interest is extended to new learning.

Many vocational colleges are currently undergoing teaching reforms to reflect national policy guidelines, especially with regard to solving the lack of learning interest among vocational college students. Of special interest in this study is a vocational college, Urban Vocational College of Sichuan, an exemplar for teaching reform and informatization development. This college in China's Sichuan province was equipped with an AR/VR laboratory aimed at improving teaching quality, with emphasis on international development of its students. As the college placed great importance on English learning, its English courses had been undergoing a new round of teaching reforms. In China, English is learned as a foreign language and it is a compulsory course in colleges. Students cannot obtain their diplomas without passing their English examination (Hu, 2021).

For this study, the researcher chose an English as a Foreign Language (EFL) class during one teaching unit as a case study to investigate the formation of interest among students learning English. A gamified AR app called XploreRAFE+ was used in the class; it had gamification and AR predesigned in it; it also allowed teachers to input their content to conduct their English lessons.

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1.2   Statement of the Problem

Due to vocational college students in China having a weak English language learning foundation and poor participation in class activities, their interest in learning is not very evident. Furthermore, the outdated teaching methods of vocational colleges in various subjects, including English, also contribute to the problem of students' lack of interest in learning (Zuo, 2019). Against the backdrop of the Fourth Industrial Revolution and the many technogical advancements it has transpired, educators have tried to harness technical support to promote interest in English language learning (Gu & Wu, 2021).

AR technology as an emerging technology has been shown in many studies to enhance interest in English learning effectively (Isaeva, Semenova, Nesterova & Gudkova, 2021; Lin & Tsai, 2021). Findings in past studies show that gamification learning approaches supported by AR technology have been widely applied in different disciplines (Bicen & Bal, 2016; Delello, 2014). Gamification can be effectively combined with AR technology to construct an attractive environment to enhance interest in English learning (Mei & Yang, 2019). Improving learning interest is significant for vocational college students to have better personal development and adapt to the new industrial development environment. Also, improving learning interest of students is important to reflect improved teaching quality in higher vocational education (Zuo, 2019).

Based on the above discussion, the problem associated with the proposed study is how to promote interest in English learning in China's vocational colleges. To solve the problem and keep pace with the Fourth Industrial Revolution, studies have been conducted to explore the impact of gamified AR on English learning. These studies reveal that the use of gamification and AR is advantageous in English learning and can enhance students' interest (Alizadeh, Mehran, Koguchi & Takemura, 2017; Mei & Yang, 2019; Sandy, Ulfa & Wedi, 2021). However, few studies use a qualitative research method to conduct an in-depth exploration of interest information in this new learning environment (Sirakaya & Sirakaya, 2018). In addition, not many studies have provided a strong theoretical basis to interpret the findings (He, Wang & Zhang, 2018). Therefore, in this study, the researcher selected a specific gamified AR English class during one teaching unit as a specific case to explore students' interest formation. The study can provide a deeper understanding of how vocational college students form interest in learning English in gamified AR lessons. The research findings can also contribute to solving the problem of lack of learning interest among students in vocational colleges in China.

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1.3 Objectives of the Study

The objectives of this study are to:

1. Explore the process of interest formation among vocational college students in a gamified AR environment and relevant influencing factors;
2. Explore how a gamified AR environment triggers students' interest in English language learning;
3. Explore how a gamified AR environment immerses students in English language learning;
4. Explore how a gamified AR environment extends students' learning experience.

1.4 Research Questions

1. What is the process of interest formation and its relevant influencing factors among vocational college students in a gamified AR environment?
2. How does a gamified AR environment trigger students' interest in English language learning?
3. How does a gamified AR environment immerse students in English language learning?
4. How does a gamified AR environment extend students' learning experience?

1.5 Significance of the Study

It is hoped that the findings of this study would be beneficial to teachers, students, vocational colleges, the Ministry of Education, researchers, instructional designers, and theory development.

1) Teachers and students

This study would enhance English teachers' understanding of interest formation in gamified AR lessons and help solve practical problems in English language learning, especially in China, through fostering students' learning interest. It would also encourage teachers to try to develop attractive gamified AR English courses. Moreover, by incorporating the characteristics of the subject concerned, it is hoped that instructors in other disciplines would use this study as a reference for guidelines when conducting their own gamified AR courses.

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