



**AUGMENTED REALITY IN ENHANCING LEARNING MOTIVATION
AMONG ORANG ASLI PRIMARY STUDENTS IN NON-FORMAL
SETTINGS IN PAHANG, MALAYSIA**

By

HAFIZZHAL BUKHARY BIN BORHAN

**Thesis Submitted to the School of Graduate Studies, Universiti
Putra Malaysia, in Fulfilment of the Requirements for the Degree of
Master of Science**

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DEDICATION

Praise be to Allah, this dissertation is dedicated to my cherished family, whose unwavering support and love have been the bedrock of my journey. I dedicate this work to the memory of my mother, Ibu, whose steadfast belief in my academic success continues to inspire me. Though she is no longer with us, her faith in me has propelled me forward. May Allah grant her soul eternal peace and the highest rank in Jannah. To my father, Ayah, thank you for always believing in my potential. To my wife, Kina, your unwavering support and love sustain me. To my children, Humyra, Hana, Hasya, Adam, and Hawa, remember that all things are possible, and never hesitate to pursue your dreams and aspirations. "My prayer, my sacrifice, my life, and my death are all for Allah, the Lord of the worlds."

Abstract of thesis presented to the Senate of Universiti Putra Malaysia in
fulfilment of the requirement for the degree of Master of Science

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Chairman : Nur Aira binti Abd Rahim, PhD

Faculty : Educational Studies

The issue of low learning motivation among Orang Asli primary school students in Pahang, Malaysia, has contributed to high dropout rates despite various government interventions. Socio-economic challenges and a lack of effective pedagogical approaches have exacerbated this problem, highlighting the need for innovative tools to engage these students. This study explores how augmented reality (AR), specifically the English vocabulary learning application ARvid, can enhance learning motivation among Orang Asli students in non-formal learning settings. Guided by the ARCS model (Attention, Relevance, Confidence, and Satisfaction), the study examines the impact of ARvid on learning motivation in non-formal learning contexts. Data were collected through in-depth interviews and observations with five Orang Asli students and analyzed using thematic analysis to identify key themes. The findings

reveal that ARvid helps increase student engagement, improve technology acceptance, and connect lessons to real-world experiences. Additionally, the application boosts self-confidence, self-esteem, and fosters higher learning motivation among students. The findings suggest that AR-based interventions have the potential to significantly enhance learning motivation among marginalized student populations, such as Orang Asli. This study provides actionable insights for educators and policymakers, encouraging the integration of AR into non-formal learning settings as an engaging and innovative tool. Recommendations also emphasize the importance of teacher training in AR technologies to ensure effective implementation, and the development of culturally relevant AR content that resonates with Orang Asli students. These efforts align with the United Nation's Sustainable Development Goals (SDG) 4: Quality Education and SDG 10: Reduced Inequality, promoting inclusive educational practices and providing a scalable approach to tackling learning motivation challenges in rural communities. Further research is needed to explore the sustainability and long-term effects of AR interventions in various educational and cultural contexts.

Keywords: ARCS, Augmented Reality, Learning Motivation, Orang Asli

SDG: GOAL 4: Quality Education, GOAL 10 : Reduced Inequality

luar bilik darjah dalam keadaan tidak formal. Data dikumpul melalui temubual mendalam dan pemerhatian terhadap lima orang murid Orang Asli dan dianalisis menggunakan analisis tematik untuk mengenal pasti tema-tema utama. Dapatan kajian menunjukkan bahawa ARvid membantu meningkatkan penglibatan murid, memperbaiki penerimaan teknologi, dan menghubungkan pelajaran dengan pengalaman dunia sebenar. Selain itu, aplikasi ini juga meningkatkan keyakinan diri, harga diri, dan memupuk motivasi pembelajaran yang lebih tinggi dalam kalangan murid. Dapatan kajian ini mencadangkan bahawa intervensi berasaskan AR berpotensi untuk meningkatkan motivasi pembelajaran dalam kalangan kumpulan murid yang terpinggir, seperti murid Orang Asli. Kajian ini memberikan satu visi yang boleh dilaksanakan untuk pendidik dan pembuat dasar, dengan menggalakkan pengintegrasian AR dalam program pembelajaran bukan formal sebagai alat pembelajaran yang menarik dan inovatif. Saranan untuk menekankan kepentingan latihan guru dalam teknologi AR untuk memastikan pelaksanaannya yang berkesan, serta pembangunan kandungan AR yang relevan dengan budaya yang sesuai dengan murid Orang Asli. Usaha-usaha ini selaras dengan Matlamat Pembangunan Mampan (SDG) iaitu SDG 4: Pendidikan Berkualiti dan SDG 10 : Mengurangkan Ketidaksamaan, dalam mempromosikan amalan pendidikan inklusif serta menyediakan pendekatan yang boleh diskalakan untuk menangani cabaran motivasi pembelajaran dalam komuniti luar bandar. Kajian seterusnya adalah dicadangkan untuk menilai kesan jangka panjang dan kesinambungan intervensi AR dalam pelbagai konteks pendidikan dan budaya.

Kata kunci: ARCS, Motivasi Pembelajaran, Orang Asli, Realiti Tambahan

SDG: MATLAMAT 4 : Pendidikan Berkualiti, MATLAMAT 10: Mengurangkan Ketidaksamaan



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CHAPTER 1

INTRODUCTION

1.1 Background

Malaysia is a country in South-East Asia with eleven states and two federal territories in Peninsular Malaysia. The other two states and one federal territory are in East Malaysia, with a population estimated at 32.7 million (Department of Statistics Malaysia, 2020). It is not only attractive for its biodiversity but also for its communities of indigenous people, or Orang Asli, who have inhabited Peninsular Malaysia since the 8th Century BC (Mohd Nor et al., 2018). They are considered a minority in Malaysia's total population, with unique languages, beliefs, cultures, and knowledge of practices for the sustainable management of natural resources. The Orang Asli population, estimated at approximately 207,000 individuals (International Work Group for Indigenous Affairs [IWGIA], 2019), has been the focus of various economic and social development initiatives aimed at enhancing their quality of life. These initiatives, administered by the Department of Orang Asli Development (JAKOA), encompass several key programs, including the Structured Resettlement Programme (SRP), which facilitates relocation and housing stability, the Economic Development Programme (EDP), designed to promote sustainable livelihoods, and the Social Development Programme (SDP), which seeks to improve healthcare, education, and community well-being. These

programs aim to address the socio-economic challenges faced by the Orang Asli communities, focusing on infrastructure, income generation, and overall well-being (JAKOA, 2020; Golam Hassan, 2017). They are separated into three main tribal groups: Negrito in the northern Peninsular, Senoi in the central region, and Melayu Proto in the southern region. Each subgroup, such as Jahai, Temiar, Semai, Temuan, and others, has its own languages and cultures (JAKOA, 2011-2015). Most Orang Asli live near forests and coastal areas, while some reside in remote and rural locations. Table 1 shows the distribution of Orang Asli in Peninsular Malaysia, issued by JAKOA in 2020.

The quality of life covers various aspects for all individuals from all walks of life, including access to quality education and learning experiences that foster motivation. In order to stimulate the development of education among Orang Asli, Malaysia's government has taken aggressive measures to improve their living conditions, including education. As a vital component of the quality of life campaign, education is at the heart of the Orang Asli's development agenda (Hussein et al., 2017). However, the lack of motivation among Orang Asli students remains a major challenge in ensuring active learning participation. Despite various interventions, the standard of education among Orang Asli in Malaysia has not undergone dramatic improvements (Hussein et al., 2017). Several reasons for poor academic performance have been identified. The most common factors include local culture, geographical constraints, the attitudes of local leaders, the effectiveness of supporting agencies, and challenges related to the teaching and learning process,

particularly in fostering motivation and engagement (Abdullah et al., 2013; Mohd Nor et al., 2018).

Recent studies have highlighted the importance of culturally responsive teaching methods and community involvement in addressing these challenges. For instance, integrating local cultural elements into the curriculum and providing teacher training programs tailored to the needs of Orang Asli students have shown promise in improving engagement and academic outcomes (Hussein et al., 2017; Mohd Nor et al., 2018). Additionally, the use of technology, such as mobile learning and digital resources, has been proposed as a way to overcome geographical barriers and enhance access to quality education (Ismail et al., 2019). These approaches align with global trends in education, where technology and culturally relevant pedagogy are increasingly recognized as key drivers of student motivation and success (Radovan & Makovec, 2015; Bacca et al., 2014).

Table 1:Orang Asli Ethnic Distribution by Ethnic Group and State 2020

No	State	Ethnic			Total
		Senoi	Proto-Malay	Negrito	
1	Johor	46	15,562	-	15,608
2	Kedah	29	10	271	310
3	Kelantan	14,774	47	1,825	16,646
4	Melaka	19	1,728	-	1,747
5	Negeri Sembilan	91	11,925	1	12,017
6	Pahang	35,654	41,644	1,127	78,425
7	Perak	57,120	627	2,818	60,565
8	Selangor	5,297	15,156	3	20,456
9	Terengganu	880	85	38	1,003
	Total	113,910	86,784	6,083	206,777
	Percentage	55.09%	41.97%	2.94%	100%

Note: Data from *Table of Orang Asli Ethnic Distribution by State*, by Jabatan Kemajuan Orang Asli (JAKOA), 2020, *JAKOA Official Website* (<https://www.jakoa.gov.my/orang-asli/table-of-orang-asli-ethnic-distribution-by-state/?lang=en>). Copyright 2020 by Jabatan Kemajuan Orang Asli.

The learning experience plays a significant role in the primary school teaching and learning process, especially for students, particularly the Orang Asli, who require more attention to increase their motivation and satisfaction during the learning process.

It has been shown that the integration of technology in teaching contributes to an improvement in students' motivation levels. Technological innovation has led to widespread use of technology in all sectors, including education.

Recently, technology has been widely used and evolving worldwide in the field of education. Augmented Reality, also known as AR, is one of the technologies that has the potential to attract students' interest when applied to the learning process (Nincarean et al., 2013). One of the key benefits of AR in education is its ability to enhance student engagement and motivation. AR experiences are inherently captivating, as they allow students to interact with digital content in a meaningful and personalized way. This increased engagement can lead to deeper learning and better retention of information. Additionally, AR can help students develop critical thinking and problem-solving skills by presenting them with real-world challenges that require creative solutions.

AR technology has been shown to motivate students to explore particular topics and subjects from various perspectives and diverse viewpoints (Kerawalla et al., 2006). The use of AR technology for interactive teaching in education is an emerging approach in Malaysia. In addition, AR can also work offline without requiring internet coverage, unlike other technologies. As the Orang Asli primary school students in rural areas are not widely exposed to this kind of technology and do not have mobile phones, it can undoubtedly provide good exposure for them to explore AR technology in their learning process (Wei et al., 2015). However, little is known about how primary school teachers could integrate the use of AR into their lessons (Kerawalla et al., 2006).

1.1.1 Background Context

The researcher main interest is in the nature of the resources and constraints that AR technology offers to Orang Asli students in Kampung Dayok, Pos Lenjang, Pahang. Most of the children in Kampung Dayok attend SK Lenjang, Pahang, which is one of the schools in rural areas with limited access to the internet under the category of P3 (*Ministry of Education Malaysia [KPM], 2020*). Furthermore, due to limited road access, only a 4x4 vehicle is required to get to the village, which indicates that the location of the village and the nearest school, SK Lenjang, is far into that area.

This research encompassed an introductory exploration of the characteristics of Augmented Reality (AR), including an examination of the utilized technology and its implementation within the educational setting of the Orang Asli community. Following that, a qualitative case study was undertaken to evaluate the effects of the ARvid, a freely available English AR vocabulary learning application, on the motivation to learn among Orang Asli students. To analyze the collected data within the framework of the Attention, Relevance, Confidence, and Satisfaction (ARCS) model, the researcher employed in-depth interviews and observational techniques.

In recent years, the government, under the Ministry of Education, took several measures to improve the quality and efficiency of the teaching and learning

process across all educational levels, from preschool to secondary school. The Ministry reviewed some suggestions to transform the education system and integrated them into the Blueprint based on specific criteria. The Blueprint aimed to ensure that every child became proficient in Bahasa Malaysia and English and leverage these skills to scale up the quality of learning nationwide, as outlined in the *Pelan Pembangunan Pendidikan Malaysia (Pelan Pembangunan Pendidikan Malaysia 2013-2025 (Pendidikan Prasekolah Hingga LePas Menengah)*, 2013). The Blueprint also included opening up more opportunities for Orang Asli to study at sports and art schools, in addition to providing access to Technical and Vocational Education and Training (TVET). Significant efforts have been made to raise the standard of formal education for those living in rural areas. Jabatan Kemajuan Orang Asli (JAKOA) is one of the development agents that implemented the government's development plans, with numerous programs and initiatives aimed at improving the education level of Orang Asli.

1.2 Problem Statement

Despite numerous efforts to sustain learning engagement among Orang Asli students, the issue of school dropout remains prevalent, with significant implications for their educational outcomes and future opportunities. Research indicates that Orang Asli students in Malaysia consistently underperform compared to their non-Orang Asli peers, with lower academic achievements and higher dropout rates (Hussein et al., 2017; Mohd Nor et al., 2018). The

root causes of this problem are multifaceted, encompassing socio-economic challenges such as poverty, geographic isolation, and limited access to educational resources, as well as cultural and pedagogical barriers (Ismail et al., 2019; Abdullah et al., 2013). For instance, communication gaps, social prejudice, and inadequate teaching facilities further exacerbate the educational disparities faced by this community (Hussein et al., 2017).

Pedagogical factors also play a critical role in shaping the learning experiences of Orang Asli students. Traditional teaching methods, which often rely on rigid and teacher-centered approaches, have been found to demotivate students and fail to cater to their unique learning needs (Mohd Nor et al., 2018). These methods are particularly ineffective in addressing the abstract nature of certain subjects, such as science and mathematics, which require strong visualization and conceptual understanding (Gilbert, 2004). When students struggle to grasp complex concepts, it can lead to misconceptions, disengagement, and ultimately, dropout (Radovan & Makovec, 2015). To address these challenges, there is a pressing need for innovative teaching tools that can make learning more interactive, engaging, and accessible, particularly for students in rural and underserved areas.

Augmented Reality (AR) has emerged as a promising educational tool, offering immersive and interactive learning experiences by overlaying virtual content onto the real world (Wu et al., 2013). AR has been shown to enhance student motivation, improve conceptual understanding, and foster deeper

engagement in the learning process (Bacca et al., 2014; Khan et al., 2019). However, despite its potential, the application of AR in education remains underexplored, particularly among marginalized communities such as the Orang Asli. Limited research has examined how AR can be used to address the unique challenges faced by Orang Asli students, including their geographic isolation, limited access to technology, and cultural barriers (Ismail et al., 2019).

This study seeks to fill this gap by investigating the potential of AR as a motivational tool for Orang Asli students in rural areas with limited educational facilities. Specifically, it aims to explore how AR can enhance student engagement, improve learning outcomes, and address the pedagogical challenges faced by this community. By doing so, this research will contribute to the growing body of knowledge on the use of AR in education while providing actionable insights for policymakers, educators, and stakeholders working to improve educational equity for Orang Asli students.

1.3 Research Objectives

There are two objectives of this qualitative research. The objectives are:

1. To explore the perception of Orang Asli children in the use of AR technology in the non-formal learning process in Kampung Dayok, Pahang.
2. To explore the impact of an AR mobile application called ARvid on the Orang Asli children learning motivation of Orang Asli children in Kampung Dayok, Pahang.

1.4 Research Questions

This research will be conducted to answer the following research questions:

1. How do Orang Asli children perceive the AR technology in the non-formal learning process in Kampung Dayok, Pahang?
2. How does the AR mobile application called Arvid enhance the learning motivation of Orang Asli children in Kampung Dayok, Pahang?

1.5 Significance of Study

This research will explore the potential of Augmented Reality (AR) as a tool for fostering learning motivation among Orang Asli students in Pahang. The findings from this study will have significant implications for various

stakeholders. It will introduce innovative educational tools in rural Orang Asli schools, offering a new way to engage students and enhance their learning experiences. The study will also support teachers by helping them integrate AR technology into their teaching methods, which could increase student engagement and improve educational outcomes. Furthermore, the research has the potential to inform policymakers in the Ministry of Education, providing valuable insights into how alternative methods like AR can address the loss of interest in school among Orang Asli students and contribute to educational equity. Finally, the community will benefit from an increased awareness of how modern technologies can be applied to overcome barriers to education in rural areas, ultimately empowering the Orang Asli community to improve their educational outcomes.

1.6 Scope and Limitation of Study

This study was designed as a comprehensive case study with the primary objective of introducing Augmented Reality (AR) technology to Orang Asli students in Pahang, aiming to explore its potential as an integration tool for creating motivational learning experiences among these students. While the study provides valuable insights, it is essential to acknowledge its scope and limitations to ensure a balanced interpretation of the findings.

The study focuses on the use of AR technology, specifically an AR mobile application called ARvid, to enhance the learning motivation of Orang Asli primary school students. The research was conducted at in Kampung Dayok,

Pahang, and involved Primary 4 students as the primary respondents. The scope of the study includes exploring the perceptions of Orang Asli children toward AR technology in non-formal learning, investigating the impact of ARvid on the learning motivation of Orang Asli children, and providing recommendations for the integration of AR technology in educational settings for marginalized communities.

Despite its contributions, the study encountered several limitations that should be considered when interpreting the findings. The study was restricted to Primary 4 students from Kampung Dayok. While this allowed for a focused examination of the targeted group, it limits the generalizability of the findings to other age groups or educational levels within the Orang Asli community (Hassan, 2015). For instance, younger or older students may have different levels of technological familiarity or learning needs, which could influence the effectiveness of AR technology. Additionally, the findings may not be applicable to Orang Asli students in other regions with different sociocultural contexts or resource availability (Mohd Nor et al., 2018).

The study was conducted exclusively in Kampung Dayok, Pahang and most of the students are from SK Lenjang, Pahang. While this setting provided a controlled environment for data collection, it may limit the broader applicability of the findings. Variations in regional characteristics, such as access to technology, infrastructure, and cultural practices, could influence the outcomes of similar interventions in other Orang Asli communities (Ismail et

al., 2019). Therefore, caution should be exercised when generalizing the findings beyond the specific context of Kampung Dayok.

The implementation of AR technology in rural areas posed significant technical challenges, including inadequate Internet connectivity, limited availability of suitable devices, and software functionality issues (Bacca et al., 2014). These constraints not only increased the time and cost of data collection but also introduced potential biases in the data. For example, students with limited prior exposure to technology may have faced difficulties using the AR application, which could have affected their engagement and motivation levels (Radovan & Makovec, 2015).

The study was conducted within a limited timeframe, which restricted the depth and breadth of data collection. Additionally, the outbreak of Covid-19 further complicated the research process, as movement control orders intermittently in effect since March 2020 disrupted access to up-to-date information and resources (Hussein et al., 2020). For instance, the lack of current census data on the Orang Asli population may have affected the accuracy and comprehensiveness of the study's findings.

As a qualitative case study, the research design prioritized depth over breadth, focusing on a small, specific group of participants. While this approach allowed for detailed insights into the experiences of Orang Asli students, it may lack the statistical generalizability of quantitative studies (Creswell & Poth, 2018).

Furthermore, the reliance on self-reported data from students and teachers may introduce biases, as participants may provide socially desirable responses or misinterpret the questions.

While this study provides valuable insights into the potential of AR technology for enhancing the learning motivation of Orang Asli students, it is important to recognize its limitations. These include the restricted sample size, geographical and contextual constraints, technical challenges, time and resource limitations, and the inherent limitations of the qualitative case study design. Acknowledging these constraints is crucial for interpreting the findings and guiding future research in this area.

1.7 Terminologies of the Definitions

For this research, key terms are defined both conceptually and operationally to provide clarity and context. The definitions are categorized into conceptual definitions, which describe the theoretical meanings of the terms, and operational definitions, which explain how the terms are applied and measured in this study.

Augmented Reality (AR) is conceptually defined as a technology that enhances the real-world environment by overlaying computer-generated sensory information, such as visuals, sounds, or haptic feedback, onto it (Carmigniani & Furht, 2011). AR systems typically employ computer vision, tracking

technologies, and display devices to seamlessly integrate virtual content into the user's physical surroundings. In education, AR has been shown to create immersive and interactive learning experiences, enabling students to visualize complex concepts, manipulate virtual objects, and engage in hands-on activities (Wu et al., 2013). Operationally, AR in this study refers to the use of an AR mobile application called ARvid, which overlays virtual objects (e.g., 3D models, animations) onto the real-world environment through a smartphone or tablet. ARvid is used as a tool to enhance the learning experiences of Orang Asli students by providing interactive and engaging content in a non-formal learning setting.

Learning motivation is conceptually defined as the internal drive, desire, and enthusiasm that influence students' engagement, persistence, and effort in the learning process (Cotton, 1995). It is a multidimensional construct that includes intrinsic motivation (internal satisfaction from learning), extrinsic motivation (external rewards or recognition), self-efficacy (belief in one's ability to succeed), and goal orientation (focus on mastery or performance) (Pintrich, 2003). Operationally, learning motivation in this study is measured through students' engagement with the ARvid application, their self-reported levels of interest and enjoyment, and their persistence in completing AR-based learning activities. The ARCS model (Attention, Relevance, Confidence, and Satisfaction) is used as a framework to assess and enhance motivation (Keller, 2010).

Non-formal learning is conceptually defined as structured educational activities that occur outside the formal school system, often in community-based or informal settings (Rogers, 2004). It is characterized by flexibility, learner-centered approaches, and a focus on practical skills and knowledge. Operationally, non-formal learning in this study refers to the use of ARvid in a community-based setting at SK Lenjang, Kampung Dayok, where students engage in interactive and hands-on learning activities outside the traditional classroom environment.

Perception is conceptually defined as the process by which individuals interpret and make sense of sensory information from their environment (Gibson, 1979). In the context of education, perception involves how students interpret and respond to new learning tools or methods. Operationally, perception in this study is measured through qualitative interviews and observations to understand how Orang Asli students interpret and respond to the use of ARvid in their learning process.

The ARCS model, developed by Keller (2010), is a framework for understanding and enhancing learning motivation. It consists of four components: Attention, Relevance, Confidence, and Satisfaction. Attention refers to capturing and sustaining students' interest in the learning material. In this study, attention is measured through students' engagement with ARvid's interactive features, such as 3D models and animations. Relevance refers to ensuring that the learning material is meaningful and applicable to

students' lives. Next is relevance, which has been assessed by aligning ARvid's content with the cultural and educational needs of Orang Asli students. Confidence refers to building students' belief in their ability to succeed in learning tasks. In this study, confidence is measured through students' self-reported feelings of competence and their ability to complete AR-based activities. Satisfaction refers to providing positive reinforcement and a sense of accomplishment. Here, satisfaction is assessed based on students' enjoyment of the ARvid experience and their willingness to continue using the application.

This section has defined the key terminologies used in the study, providing both conceptual and operational definitions. By clarifying these terms, the research establishes a strong foundation for understanding the variables and constructs under investigation. The inclusion of the ARCS model further enhances the study's focus on learning motivation, ensuring a comprehensive approach to analyzing the impact of AR technology on Orang Asli students.

1.8 Chapter Summary

This chapter introduces the study on the educational challenges faced by Orang Asli students in Malaysia, especially those in rural and remote areas. Despite the government's efforts to improve their living conditions, Orang Asli students continue to experience low educational achievement due to factors like poverty, geographical isolation, and traditional teaching methods. The

chapter highlights the potential of Augmented Reality (AR) technology to enhance student engagement and motivation. AR, which enables interactive learning motivation and experiences, could be particularly beneficial for Orang Asli students with limited access to technology. The study focuses on the ARvid app at SK Lenjang, a school in Kampung Dayok, Pahang, and examines its impact on students' motivation. The research aims to explore how Orang Asli children perceive AR in non-formal learning and its effect on their learning motivation. The study is significant for introducing innovative learning tools to improve the educational experience for Orang Asli students. However, limitations such as a small sample size, specific location, and technical challenges with AR technology are acknowledged.

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