INTEGRATING VIRTUAL REALITY IN DRAWING SUBJECTS WITH AN EXPERIENTIAL LEARNING APPROACH TO ENHANCE STUDENT EXPERIENCE

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UNIVERSITI PENDIDIKAN SULTAN IDRIS

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ABSTRACT

The education sector has undergone significant changes over the years, and digital technology has impacted how students learn in the classroom. This research explores how students' experiences with virtual reality (VR) technology can enhance their creativity and self-expression. The study aims to investigate the potential of immersive VR painting as a core curriculum component in art education to enhance students' learning experiences. Qualitative data collection methods include interviews, VR assignments, and experience mapping with academics, industry experts and students. The participants consisted of four academics with over five years of experience in art and design education, two industry experts from VR companies in Malaysia with over five years of industry experience, and five undergraduate students in Creative Multimedia. The data collection process is divided into two phases. In the first phase, data is collected from academics and industry experts to gain valuable insights and recommendations on the effective implementation of VR in art and design education. Next, the second phase involves studying student-based experiential learning through VR painting assignments among first- and second-year students. After completing the tasks, students gather to discuss and map their creative ideas, and semi-structured interviews are conducted to explore students' experiences in-depth. The interview coding process is analysed using the qualitative data analysis program Atlas.Ti 12. The study results will provide a comprehensive understanding of the potential for integrating VR technology in the creative, art, design education industries and how it can enhance experiential learning by fostering creative ideation. Furthermore, this research proposes modules to be included in the art and design curriculum to maximise the advantages of VR technology.

MENGINTEGRASIKAN VIRTUAL MAYA DALAM SUBJEK LUKISAN DENGAN PENDEKATAN PEMBELAJARAN BERASASKAN PENGALAMANUNTUK MENINGKATKAN PENGALAMAN PELAJAR

ABSTRAK

Sektor pendidikan telah mengalami perubahan yang signifikan selama bertahun-tahun, dan teknologi digital telah memberikan impak yang besar pada cara pelajar belajar di dalam kelas. Penyelidikan ini memberi tumpuan untuk meneroka bagaimana pengalaman pelajar dengan teknologi Realiti Maya (VR) boleh meningkatkan kreativiti mereka dalam ekspresi diri. Kajian ini bertujuan untuk meneroka potensi lukisan terbenam VR sebagai komponen kurikulum asas dalam pengajaran seni lukis untuk meningkatkan pengalaman pembelajaran pelajar. Kaedah pengumpulan data secara kualitatif merangkumi temubual, tugasan VR, dan pemetaan pengalaman bersama akademik, pakar industri, dan pelajar. Peserta kajian terdiri daripada empat orang akademik dengan pengalaman lebih lima tahun dalam pendidikan seni dan reka bentuk, dua orang pakar industri daripada syarikat VR di Malaysia dengan pengalaman lebih lima tahun dalam industri, dan lima orang pelajar Ijazah Sarjana Muda dalam bidang Multimedia Kreatif. Proses pengumpulan data dibahagikan kepada dua fasa. Pada fasa pertama, data dikumpul daripada akademik dan pakar industri untuk mendapatkan pandangan dan cadangan berharga mengenai pelaksanaan VR yang berkesan dalam pendidikan seni dan reka bentuk. Seterusnya, fasa kedua melibatkan kajian pembelajaran berasaskan pengalaman pelajar melalui tugas melukis menggunakan VR dalam kalangan pelajar tahun satu dan tahun dua yang berbeza. Setelah selesai melaksanakan tugas, para pelajar berkumpul untuk membincangkan dan memetakan idea-idea kreatif mereka, serta temu bual secara separa berstruktur dijalankan untuk meneroka pengalaman para pelajar dengan lebih mendalam. Proses pengkodan temu bual dianalisis menggunakan program analisis data kualitatif, Atlas.Ti 12. Hasil kajian akan memberikan pemahaman yang menyeluruh tentang potensi untuk menyesuaikan teknologi VR dalam pendidikan industri kreatif, seni, dan reka bentuk serta bagaimana ia dapat meningkatkan pembelajaran barasaskan pengalaman pelajar dengan mendorong ideasi kreatif. Selain itu, kajian ini mencadangkan modul-modul untuk dimasukkan dalam kurikulum seni dan reka bentuk bagi memaksimumkan kelebihan teknologi VR.

CONTENTS

LIST OF TABLES

LIST OF FIGURES

CHAPTER 1

INTRODUCTION

1.0 Introduction

Drawing is a fundamental skill in art and design education, connecting tradition and innovation (Herrero, 2024). It has a rich history but remains crucial in contemporary learning. Enhancing drawing skills in higher education is essential, prompting the exploration of advanced tools to improve the learning experience.

Virtual Reality (VR) naturally fits into this exploration, offering a unique way to express ideas and learn spatial concepts. VR immerses students in interactive environments, aligning with the needs of art and design education. The blend of traditional

craftsmanship with VR technology has the potential to transform how students engage with the creative process, fostering spatial understanding and expanding artistic expression.

In Malaysia, students pursuing art and design education often face challenges in grasping 3D spatial concepts and translating them into their drawings (İbili et al., 2020). Traditional methods may not adequately address these challenges, leading to a gap in understanding and skill development. This gap underscores the importance of integrating innovative approaches like VR into the curriculum.

Our research addresses gaps in current art and design education. While traditional methods are foundational, they may not provide the immersive learning experiences required by 21st-century learners. VR serves as a catalyst for change, allowing for experiential learning based on Kolb's Experiential Learning Cycle (Ummihusna et al., 2024). This approach aims to connect tradition and innovation, providing students with a well-rounded drawing education.

Introducing VR into the drawing subject goes beyond mere technology integration. It has the potential to revolutionise how students think, create, and communicate in the ever-changing field of art and design. In the upcoming chapters, we will explore the theories, methods, and findings from our study on using VR for expression and spatial learning in higher education art and design programs.

1.1 Background of the Study

The fast-paced evolution of digital technologies has opened up new avenues for enhancing education and improving the quality of learning experiences. Education has always been a cornerstone of thriving societies, with the transfer of knowledge being a longstanding priority (Chi & Idris, 2021). In the digital era, there is a unique opportunity to leverage technology for more efficient and effective knowledge transfer (Chi & Idris, 2021). Recognizing this potential, the Malaysian Education Blueprint (2013-2025) has set the stage for integrating ICT to elevate learning quality across the country, manifesting in initiatives like the establishment of electronic and smart schools since 2013 (Ebrahimi & Jiar, 2018).

In this context, the integration of Virtual Reality (VR) into education emerges as a natural progression (Hu-Au et al., 2017). VR, with its myriad benefits, offers a transformative learning experience, moving beyond traditional teaching methods (Qasim, 2024). The shift towards student-centric education is facilitated by VR, encouraging learners to explore and discover, fostering creativity and interaction with their own imagination.

The educational potential of VR is underscored by the active participation it encourages, as highlighted by Shabiralyani et al. (2015), who emphasise that learners retain up to 90% of what students learn through active participation. VR, therefore, becomes a crucial tool in building better learners by providing real-life experiences that may be challenging, dangerous, expensive, or impractical to achieve otherwise (Alhalabi, 2016).

Research by De Luca et al. (2023) reinforces the efficacy of VR technology over traditional classroom instruction in enhancing academic learning gains and cognitive skill development. The immersive and experiential nature of VR-based learning creates a focused, distraction-free environment, contributing to a deeper engagement with the subject matter (Goi, 2024). This heightened engagement is expected to positively impact retention rates, underlining the significance of technology in 21st-century education (Phoon et al., 2021).

However, the adoption of technology in education, especially in the 21st century, poses challenges related to developing essential competencies. As we navigate this technological shift, it is imperative to consider the key elements of any educational transformation: the students. According to Treve (2021), academic institutions face the challenge of integrating new technologies effectively, requiring strategies that promote awareness, understanding of innovation, and encourage the incorporation of changes within the academic curriculum. In light of these considerations, the exploration of Virtual Reality as a tool for expression and spatial learning in art and design higher education becomes a compelling avenue for bridging the gap between traditional methods and innovative approaches.

1.2 Problem Statement

The integration of Virtual Reality (VR) into drawing education offers a transformative avenue for enriching learning experiences. However, despite its potential benefits, several

challenges hinder its effective implementation. In Malaysia, students often struggle with capturing three-dimensional (3D) art and comprehending spatial dimensions, particularly in fundamental drawing classes (Abdullah et al., 2024). Traditional methods may not adequately address these challenges, necessitating innovative pedagogical approaches (Tan, 2021).

This study aims to address the gap between traditional drawing education and contemporary learner needs by investigating the integration of VR within drawing instruction. Specifically, it seeks to explore how an experiential learning approach facilitated by VR can enhance students' spatial comprehension and artistic expression.

The research is motivated by the observed difficulties students face in translating 3D understanding onto a 2D surface, underscoring a broader issue in spatial comprehension within drawing education. By identifying and addressing these challenges, this research aims to contribute to the body of knowledge by providing insights into effective pedagogical strategies for utilising VR in drawing instruction.

Understanding the compatibility of VR with established educational paradigms is crucial, as resistance among educators and students may impede its adoption (Cook et al., 2019). Additionally, technical challenges such as access to VR devices and educator competence need to be addressed to ensure successful integration into the curriculum (Chi & Idris, 2021).

By evaluating the effectiveness of VR in promoting creativity and spatial skill development, this research aims to fill existing knowledge gaps regarding the specific learning outcomes and impact on students' drawing abilities. Furthermore, investigating factors influencing the acceptance of VR as an educational tool will inform strategies to enhance its integration.

Overall, this research seeks to contribute to a nuanced understanding of how VR can be effectively employed in drawing education, aligning with the evolving needs of 21st-century learners and enriching the educational experience.

1.3 Theoretical Framework

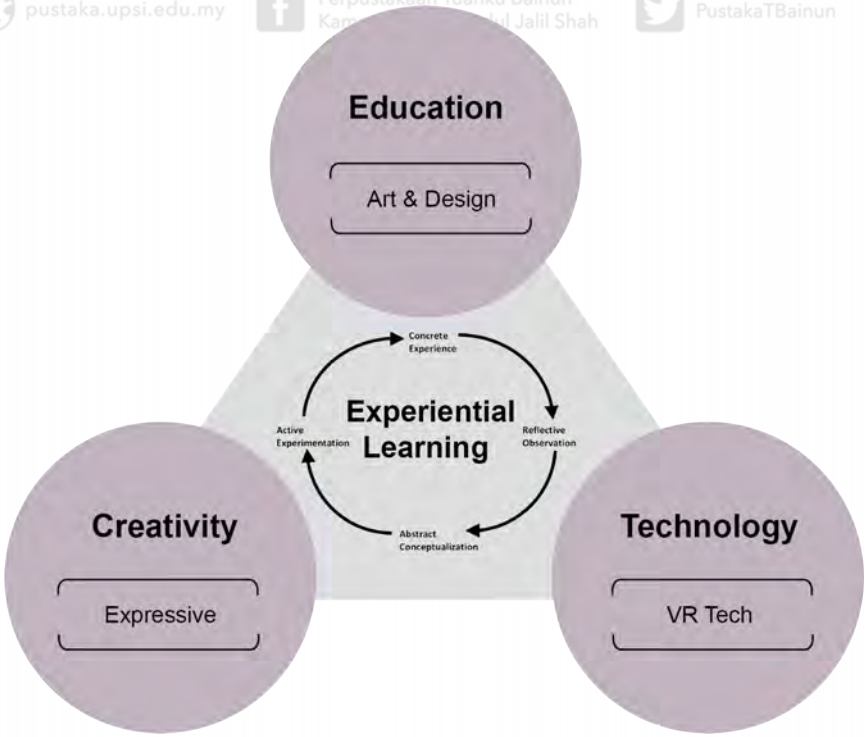

Figure 1.1. Kolb's Adaptation Theoretical Framework

This research explores the integration of Virtual Reality (VR) technology into the drawing subject within the context of art and design higher education. The focus is on implementing VR drawing as a tool for expression and spatial learning, employing an experiential learning approach to enrich students' learning experiences. The theoretical framework as shown in Figure 1.1.

Kolb's experiential learning cycle is a model that describes how individuals learn through experience. The cycle consists of four stages:

1. Concrete experience: This involves actively experiencing an event or situation either physically or through observation.
2. Reflective Observation: This stage involves observing and reflecting on the experience from different perspectives.
3. Abstract conceptualisation: This stage involves creating generalisations and theories based on the reflective observations of the experience.
4. Active experimentation: This stage involves testing new ideas and theories by actively applying them in new situations.

Experiential Learning Approach. Experiential Learning Cycle, as conceptualised by Kolb, comprising four stages: Concrete Experience, Reflective Observation, Abstract Conceptualization, and Active Experimentation. This model provides a framework for understanding how individuals learn through active engagement, reflection, theory-building, and practical application.

Effectiveness of Experiential Learning in Drawing. Experiential learning approach is effective in cultivating students' understanding and mastery of basic drawing knowledge and skills relevant to the art and design field. Recognizing the transformative nature of learning as a process that arises from the reflection and transformation of experiences aligns with the goals of this study (Chiu et al., 2023).

Art, Creativity, and Technology. Creativity is intrinsically linked to art, and its development is emphasised as a process of exploration and discovery rather than a focus on the final product (Som et al., 2023). Drawing, as a form of visual art, provides a platform for self-expression and creativity.

The integration of Virtual Reality technology into the creative process has shown promise in enhancing artistic expression. VR allows users to create three-dimensional artwork in virtual spaces, providing a unique and immersive platform for spatial learning (Wang et al., 2024). Studies have demonstrated that VR conditions lead to higher-quality creative outputs, suggesting the potential for VR to unlock hidden creativity in art and design education (Huang et al., 2024).

Technology in Art and Design Education. Technology is recognized as a transformative force in shaping contemporary education, particularly in the art and design domain. It is positive integration into education broadens horizons, minimises challenges, and facilitates creative exploration (Pavlou & Castro-Varela, 2024).

Application of VR in Drawing Education. This study builds upon the understanding that VR has the potential to revolutionise drawing education by offering a novel and immersive tool for expression and spatial learning. By leveraging VR technology, students can engage in drawing activities within virtual environments, providing a unique and enriched learning experience.

This theoretical framework establishes the groundwork for investigating the integration of VR drawing into art and design higher education, employing an experiential learning approach. The subsequent exploration will delve into the practical implementation of VR technology to enhance students' learning experiences in the drawing subject.

1.4 Conceptual Framework

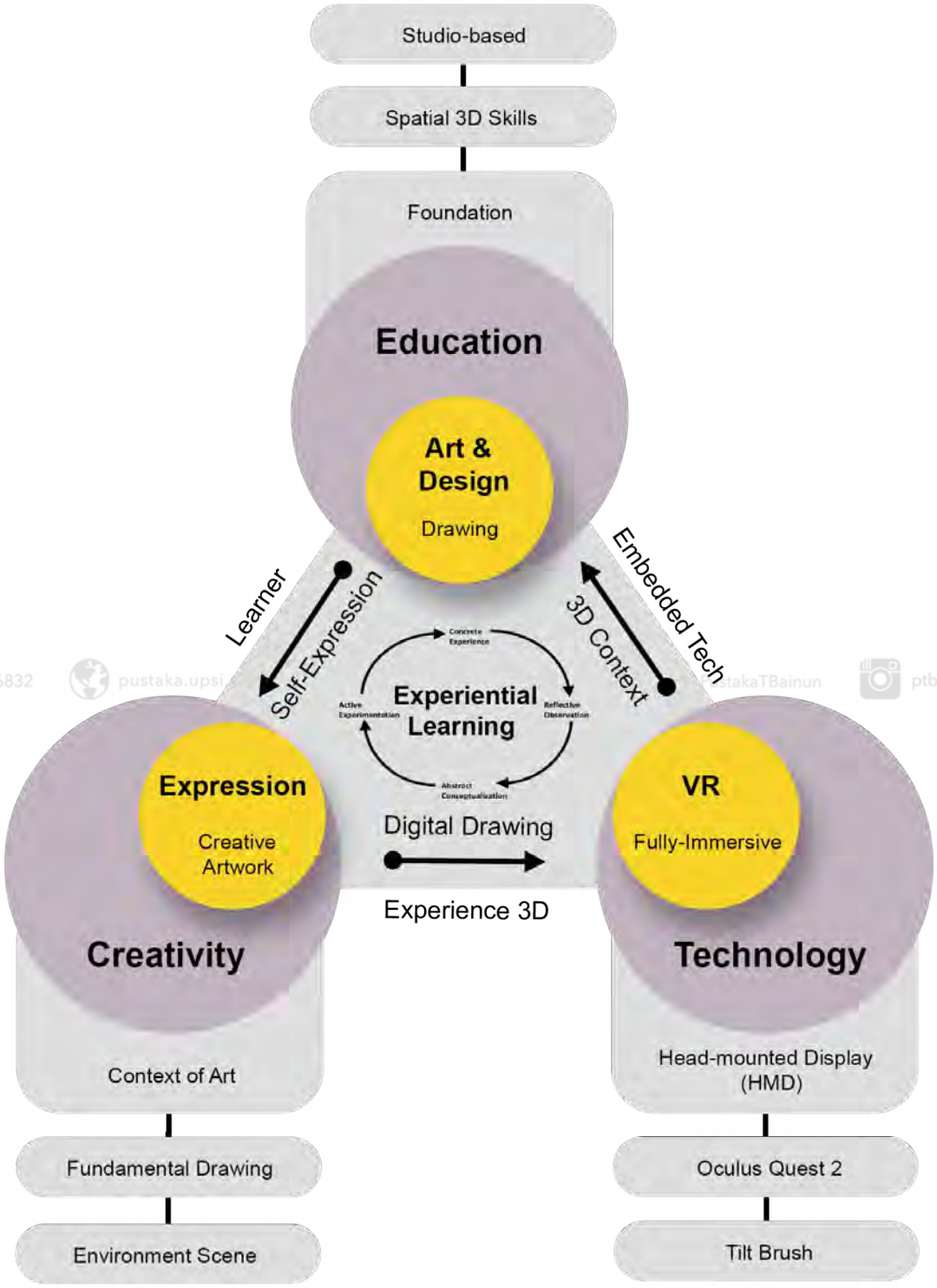

Figure 1.2. Proposed Conceptual framework

The conceptual framework, as shown in Figure 1.2, outlines three interconnected phases: education, creativity, and technology, converging towards students' experiential learning. This framework serves as the foundation for implementing Virtual Reality (VR) drawing as a tool for expression and spatial learning in art and design higher education.

Experiential Learning Cycle in VR Drawing Education

1. Concrete Experience: VR drawing education offers students a hands-on, immersive experience, allowing them to express ideas in a spatial environment and experiment with various drawing mediums.
2. Reflective Observation: After the VR drawing experience, students engage in reflective observation by reviewing and analysing their work, discussing it with peers and instructors, and using screenshots or recordings for in-depth analysis.
3. Abstract Conceptualisation: Students, during this phase, analyse their VR drawings from different angles, identify themes and concepts, and explore similarities and differences within their work.
4. Active Experimentation: In the final stage, students apply their insights to new situations, experimenting with different drawing techniques and mediums in the VR space, thereby deepening their understanding of the drawing process.

Role of Experiential Learning in Art and Design Education. Experiential learning, emphasising students' active engagement and direct contact with the subject, is recognized as a catalyst for enhanced interest, satisfaction, and learning outcomes (St John

& Suhendra, 2024). This approach empowers art and design students to explore and understand drawing fundamentals, shaping the direction of their learning.

Phases of Art and Design Education

Foundation Level: Drawing serves as the foundational element in art and design education, facilitating self-expression, articulating ideas, and symbolising concepts (Muslim et al., 2024). Drawing and sketching are deemed essential skills for art and design students.

Creativity: In the realm of creativity, drawing plays a pivotal role in the generation and articulation of tangible ideas in the art and design process (Li et al., 2024). Manual drafting and hand-drawing contribute to the visualisation and illustration of creative concepts.

Technology Integration: The integration of technological tools, particularly Virtual Reality (VR), adds value to the learning journey, serving as a drawing medium for creative self-expression and conceptual learning experiences (Ummihusna et al., 2024). VR, exemplified by Tilt Brush, introduces students to 3D drawing in a studio-based learning environment.

Enhancement of Experiential Learning through VR. VR serves as a powerful tool in art and design education, immerses students in different environments, allowing

experimentation with new techniques and approaches (Radianti et al., 2020). VR experiences provide concrete experiences for reflection and analysis, aligning with Kolb's Experiential Learning Cycle.

Hence, this research will highlight the potential of VR painting technology for students to use as part of their learning process compared to the traditional drawing medium. Perhaps, to propose VR painting to become part of the integral components of drawing or become part of the programmed structure.

1.5 Research Objectives

This current study aims at addressing the following objectives:-

1. To employ VR technology with integration of experiential learning in assisting students with learning drawing subject.

2. To analyse the potential of 3D painting in VR on students' learning experiences.
   a. Experiential learning features:
      i. Concrete Experience
      ii. Reflective Observation
      iii. Abstract Conceptualisation
      iv. Active Experimentation

3. To propose a module of drawing into art, design and creative multimedia curriculum.

1.6 Research Questions

The specific research questions addressed in this study includes the following: -

1.1 How can VR technology help to improve and assist students' with learning drawing subject?

2.1 What are the features of 3D painting in VR that contribute to students' learning experience?

3.1 What is the current approach of drawing subject in institutions?

3.2 How to improve the drawing syllabus with integrating VR technology?

Table 1.1

Overview research objectives and research questions.

	Research Objectives	**Research Questions**
1.	To employ VR technology with integration of experiential learning in assisting students with learning drawing subject.	1. How can VR technology help to improve and assist students' with learning drawing subject?
2.	To analyse the potential of 3D painting in VR on students' learning experience. a. Experiential learning features: i. Concrete Experience ii. Reflective Observation iii. Abstract Conceptualisation iv. Active Experimentation	2. What are the features of 3D painting in VR that contribute to students' learning experience?
3.	To propose a module of drawing into art, design and creative multimedia curriculum.	3.1 What is the current approach of drawing subject in institutions? 3.2 How to improve the drawing syllabus with integrating VR technology?

Research Objective 1 and Research Question 1:

The first objective signifies the intention to combine Virtual Reality (VR) technology with an experiential learning approach to support students in their learning of drawing. Experiential learning involves "learning by doing", and VR can provide a highly immersive and interactive learning environment. The aim is to understand how the integration of these two approaches impacts students' drawing skills and knowledge.

The research question seeks to understand how Virtual Reality (VR) technology can be beneficial in enhancing and supporting students in their learning of drawing. It inquiries about the ways in which VR technology can contribute to an improved learning experience for students studying drawing.

Research Objective 2 and Research Question 2:

Second objective entails studying how 3D painting in a Virtual Reality setting influences students' learning experiences. The objective further specifies that the analysis will concentrate on the components of experiential learning, which include:

i. Concrete Experience: Learning through direct, hands-on experiences.

ii. Reflective Observation: Reflecting on experiences and gaining insights.

iii. Abstract Conceptualization: Forming new concepts and ideas based on reflections.

iv. Active Experimentation: Applying newly acquired knowledge and insights in practical situations.

Research question focuses on identifying the specific characteristics and functionalities of 3D painting in Virtual Reality that play a role in improving students' learning experiences. It aims to pinpoint the aspects of VR technology that have a positive impact on learning.

Research Objective 3 and Research Question 3:

Third objective focuses on the development of an educational module centred around drawing. The module is intended to be part of the curriculum in the fields of art, design, and creative multimedia. This suggests the creation of a structured course or learning program that encompasses drawing, and it is designed to enhance the educational offering in these areas.

First research question seeks to understand the existing methods and practices employed by educational institutions when teaching the subject of drawing. It aims to provide insights into the current strategies used in teaching this subject.

While the second research question focuses on how the syllabus or curriculum for teaching drawing can be enhanced by incorporating VR technology. It explores the potential improvements that can be made by integrating VR into the teaching of drawing.

Research objectives involve the integration of VR technology with experiential learning for drawing, an in-depth analysis of VR draw within an experiential learning framework, and the proposal of a new drawing module for inclusion in academic curricula. Research questions covering the use of VR in improving drawing education, the specific features of VR draw, the current teaching practices in institutions, and the potential enhancements through VR integration.

1.7 Significance of the Study

Drawing serves as a foundational skill in art and design, laying the groundwork for creative expression (Herrero, 2024). However, in the realm of art and design education, particularly in Malaysia, there exists a need for evolution. Ash and Carr (2024) claim that the exploration of art and design, particularly in foundational subjects, has not evolved much since 20th-century education. This suggests a need to take a closer look at how we teach art and design, especially drawing, to make sure it keeps up with the demands and changes in education today.

The significance of this study lies in its valuable contribution to the art and design program in Malaysia, offering guidance on incorporating technology based on academics, experts and students' perspectives. The research aims to explore the potential of VR technology for students in their learning process and possibly propose a new module or topic for the art, design, and creative industries curriculum. In the future, one of the subjects or modules students might need to take is 3D painting or additional tools for drawing or

illustration. The research will provide data for its implementation. The study paints a broader picture of integrating VR technology into drawing, providing immersive learning opportunities for students in art, design, and creative industries. This research enhances our understanding of academics, experts for the relevance and implementation. While will gather students' experiences with VR undergoing a task. Hence, informing new tools for drawing in immersive 3D spaces.

Current Educational Landscape. Art and design institutions in Malaysia face challenges in adapting to technological demands, with certain aspects of education remaining relatively unchanged (Meyer & Norman, 2020). The slow adoption of digital tools in art and design schools underscores the importance of exploring innovative approaches to meet 21st-century learning requirements (Mistretta, 2024).

Aligning Education with 21st Century Goals. The 21st-century education landscape requires a curriculum that aligns with the demands of the design profession, fostering a deep understanding of the value of art and design (Meyer & Norman, 2020). Art and design education must evolve into an academic discipline, imparting broader skill sets and mindsets for effective leadership and collaboration (Mistretta, 2024).

Contribution to Art and Design Program. The study contributes to the enhancement of art and design programs in Malaysia by offering guidance on the integration of VR technology based on academic perspectives, experts point of view and

students' experiences. It endeavours to bridge the gap between traditional drawing methods and contemporary technological tools. Insights from the research may pave the way for the introduction of new modules or topics within the curriculum, ensuring its relevance in the digital era.

New Learning Paradigm. Introducing VR technology as a tool for drawing signifies a paradigm shift in art and design education. The study acknowledges the importance of retaining manual drawing as a foundational skill while embracing technology to prepare students for Industry 4.0. The research proposes a novel way of learning drawing, leveraging VR to offer a fresh, immersive experience that complements traditional methods.

Empowering 3D Studies. This research holds particular significance for students engaged in 3D studies. By incorporating technology at the foundational level, it addresses challenges in comprehending 3D objects, enhancing spatial observation skills for advanced stages. Early exposure to 3D painting fosters familiarity with 3D concepts, providing a solid foundation for future 3D classes.

Reference for Higher Education Bodies. The findings of this research can serve as a valuable reference for higher education bodies in developing and updating skill standards for VR integration in art, design, and creative industries studies. Aligning with the Malaysian Education Blueprint of STEM, the research supports the development of

industry-relevant programs, contributing to Malaysia's readiness for Industry 4.0 (Yunus et al., 2024).

Advancing the Field of Art and Design. By delving into the potential of VR technology, this study enhances the understanding of students' experiences with VR drawing. It introduces a new dimension to drawing education, offering immersive learning opportunities and informing the creation of new tools for drawing in 3D spaces. The research fosters progress in art and design, positioning technology as a catalyst for creativity and spatial learning.

Hence, this research explores the transformative potential of VR technology in art and design education, specifically in the context of drawing. By merging art, creativity, and technology, the study envisions a future where VR becomes an integral and complementary component of drawing education, enriching students' learning experiences and propelling the field forward into new dimensions of expression and exploration.

1.8 Delimitation of the research

The scope of this research is limited to Malaysia, specifically targeting students at the Tunku Abdul Rahman University of Management and Technology, Creative Industries Department in Kuala Lumpur. The study includes students from a selection of private

higher institutions within the country. The research is confined to foundational art and design drawing subjects, tracking the progression of students until they enrol in 3D subjects. The primary aim is to comprehend the learning process of drawing among art and design students and, through the integration of VR as a supplementary tool, provide options for creative expression and spatial skill development.

This study exclusively focuses on undergraduate students in creative industries, specifically those undertaking foundation art and design courses. The research specifically delves into students' learning experiences, aiming to gain a comprehensive understanding of the potential value of technology in enhancing the overall student learning experience. This focused approach allows for a clearer exploration of various issues and concerns related to the integration of technology to support student learning.

1.9 Operational Definition

1.9.1 Virtual Reality (VR)

Virtual Reality (VR) in this study refers to the utilisation of computer-generated simulations to create immersive digital environments specifically designed for drawing tasks. Participants engage with 3D painting tools and interact with the virtual space using VR headsets, aiming to enhance learner experience through experiential learning approaches (Korkut & Surer, 2023).

1.9.2 Experiential Learning

Experiential Learning, as operationalized in this research, encompasses the process of learning through direct engagement with VR drawing tasks, subsequent reflection on those experiences, and synthesising acquired knowledge to cultivate creative ideas (Esola, 2022).

1.9.3 Drawing

Drawing, within the context of this study, refers to the act of creating visual representations or images using various tools such as pencils, pens, or digital mediums, typically on paper or a digital surface, and operationalized as the creation of visual content (Nalaka et al., 2021) within the virtual reality environment using 3D painting tools, where participants engage with the digital space to produce images or illustrations based on provided drawing subjects or prompts.

1.9.4 Service Design - Experience Mapping

Experience Mapping, a service design tool, is a visual representation capturing participants' experience, interactions, emotions, and thoughts during VR drawing tasks (Wodehouse et al., 2020), facilitating a comprehensive understanding of their experiential learning journey and insights within the context of this research.

1.10 Summary

This chapter provides a background to the research and articulates the problem statement concerning the integration of digital technology in education, presenting an innovative approach to learning through suitable applications. Virtual Reality (VR) emerged as an additional tool for creative creation that can be seamlessly incorporated into the classroom setting. VR is poised to foster a deeper understanding of specific subjects and enhance overall learning experiences for students. The application of VR in education is recognized for its potential to equip students with the knowledge and skills essential in the digital age, ultimately offering advantages in securing job opportunities (Kaminska et al., 2019). Motivated by this, the researcher conducted this study to explore the effective implementation of VR in drawing subjects as a supplementary tool for creative endeavours and spatial learning.