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Affective Communication in *Kathakali* Performance

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ABSTRACT

This study delves into investigating the extent of individual differences in expressiveness among *Kathakali* actors participating in the Red Beard Festival. The research employs Howard S. Friedman's Affective Communication Test (ACT), a self-report measure specifically designed to assess variations in individual expressiveness among *Kathakali* actors. The study selected 33 *Kathakali* actors who took part in the Red Beard Festival of *Kathakali* in 2021, utilising a purposive sampling method to gather participants. The Affective Communication Test (ACT) was administered to the selected participants, and a quantitative analysis was conducted to analyse the data. The descriptive measures were employed to obtain the socio-demographic profile of the participants. The results of the study revealed a range of scores on the Affective Communication Test (ACT) between 70 and 117, with a mean score of 111.55 and a standard deviation of ± 1.46 . The inferential statistical analysis demonstrated no significant differences in individual expressiveness among the participants in relation to gender, age, educational qualification, occupation, or marital status. Moreover, correlation analysis revealed that neither the number of years of training nor the years of experience had a significant impact on individual expressiveness.

Keywords: *Affective Communication Test (ACT), Kathakali, Individual Expressiveness, Kathakali Actors.*

INTRODUCTION

Expressiveness has been used to mean different attributes including acting, natural sending, communication, emotionality, femininity, extraversion, responsibility, and empathy (Friedman et al., 1980). Charles Darwin wrote in his book that "the force of language is much aided by the expressive movements of the face and body" (Darwin, 2005). "Dance/theatre is human thought and feeling expressed through the body: it is at once organised physical movement, language, and a system of rules appropriate in different social situations (Blacking & Hanna, 1986). This art form holds a profound

significance as it goes beyond mere entertainment and serves as a powerful means of communication, self-expression, and learning. The enchanting synergy of dance and theatre creates a mesmerising platform where emotions, ideas, and stories find a compelling voice through the graceful motions of the performers. The amalgamation of dance and theatre allows individuals to articulate and convey emotions, thoughts, and narratives that might be challenging to express through traditional language alone. Through intricate choreography and expressive movements, dancers and actors communicate on a level that transcends spoken words. The body becomes the canvas, painting vivid tales of joy, sorrow, love, or conflict, enabling a deep emotional connection with the audience.

Dance/theatre is not only an artistic endeavour but also a valuable educational tool. In particular, for children, it proves to be an effective mode of expression, communication, and learning (Bond, 1994). As they engage in dance/theatre activities, children develop physical coordination, discipline, and a heightened sense of body awareness. Moreover, the artistic process fosters creativity, imagination, and problem-solving skills, nurturing holistic development. Children learn to collaborate with peers, express themselves confidently, and cultivate a sense of empathy as they delve into the characters and emotions they portray. In the realm of education, dance/theatre offers an experiential and kinesthetic approach to learning, where students embody historical events, literary characters, or scientific concepts. This embodied learning experience deepens their understanding and retention of knowledge, making the educational process both enjoyable and effective. Beyond the individual benefits, dance/theatre serves as a cultural repository, preserving and celebrating the heritage and traditions of diverse communities. Through traditional dances and theatrical performances, cultural stories, rituals, and values are passed down from one generation to the next, fostering a sense of identity and collective belonging. In essence, dance/theatre represents the embodiment of the human experience, bridging the gaps between language barriers, cultural differences, and emotional complexities. It speaks a universal language that resonates with people of all ages, backgrounds, and walks of life. Whether as an art form, an educational tool, or a cultural treasure, dance/theatre continues to enrich lives, elevate human expression, and unite us in our shared journey through the boundless realm of human emotions."

Individual levels of expressiveness in acting in theatre pertain to the diverse degrees to which actors can proficiently convey and articulate emotions, thoughts, and intentions through their performances. It encompasses the actor's capacity to exhibit a broad spectrum of emotions and embody multiple characters with depth and authenticity, captivating the audience and eliciting emotional responses. Scholarly literature has identified specific emotional expressions associated with various dance forms, including joy, sadness, and anger, each intricately linked to particular factors (Shikanai et al., 2013). In the context of theatrical art, the dynamic nature of expressiveness assumes a paramount role in establishing a profound connection between performers and their audience. Notably, interactive participation during performances fosters a closer affective space between actors and the spectators, intensifying the emotional impact of the theatrical experience (Guzzanti, 1969). Moreover, the art of dance as a nonverbal mode of communication facilitates the conveyance of emotive messages, transcending linguistic barriers and resonating deeply within the spectators' psyches. This communicative essence of dance stems from its inherent ability to prompt responses and evoke emotions within the observers (Smyth, 1984). The efficacy of expressiveness in acting stems from a complex interplay of diverse factors. A multifaceted skill set underpins an actor's ability to effectively convey emotions and immerse themselves in their characters. Integral to this skill set is the actor's emotional range, enabling the portrayal of a diverse array of feelings with authenticity and genuineness. Complementary to emotional range, physical expression, encompassing body language, facial expressions, gestures, and postures, serves as a rich communicative tool for conveying emotions and character traits. Furthermore, voice modulation adds an additional layer of nuance to the actor's portrayal, allowing for the adept adjustment of tone, pitch, volume, and rhythm to suit the character's intricate emotions and persona. Intriguingly, an empathetic and profound understanding of the characters' emotions and experiences forms a vital foundation for actors to establish an emotional connection with their roles, resulting in more compelling and convincing performances. The ability to adapt and transform into various roles with ease and finesse is another hallmark of expressiveness, empowering actors to seamlessly transition between divergent characters, genres, and theatrical styles.

The concept of vulnerability assumes paramount significance in the realm of expressiveness, as actors tapping into their own vulnerabilities are better equipped to breathe authenticity and rawness into their portrayals, forging a profound emotional bond with the audience. Adequate rehearsal and preparation further amplify the actor's expressiveness by providing a robust understanding of their characters and the contextual milieu, thereby enhancing the overall quality of the performance. The collaborative interaction among co-actors and the ensuing connection with the audience contribute to the heightened impact of the theatrical experience. The on-stage chemistry and authenticity in co-actors' interactions lend credence to the portrayal of characters and their relationships, rendering them more believable and engrossing. In tandem, the connection with the audience allows actors to evoke emotional responses and engender a shared experience that lingers in the hearts and minds of the spectators long after the final curtain descends. Likewise, in dance, expressive body movement holds a pivotal role in facilitating emotional communication between performers and the audience, generating vitality and resonance within the art form (Broughton & Stevens, 2009). The intricacies of body language and the artful expression of emotions in dance bestow life and verve upon the performance, imparting a sense of continuity and rhythm reflective of the human experience (Lu, 2022). In summation, individual levels of expressiveness in acting encompass a diverse array of attributes, including emotional depth, physical expression, vocal adaptability, empathy, adaptability, vulnerability, preparation, connection with co-actors and the audience, and the capacity to thrive in live performances. The rich tapestry of expressiveness enables actors to traverse the realms of human experience, imparting a lasting impact and eliciting profound emotional responses from audiences. As such, their artistry becomes a conduit for the intricacies of human emotion, fostering an enduring bond between performers and spectators, and affirming the enduring power of theatre and dance as vibrant modes of emotional expression and communication.

Proficient actors possess an inherent ability to adeptly portray a diverse spectrum of emotions, ranging from positive states such as joy and love to more negative ones, including anger, fear, and sadness. Their performances are enriched through the assimilation of personal experiences or empathetic understanding, allowing for the portrayal of characters with an unparalleled authenticity. Crucially, the effective conveyance of emotions and character traits is achieved through the skillful utilisation of body language, facial expressions, gestures, and postures, showcasing the actors' remarkable expressiveness (Keltner et al., 2019). Similarly, the artful modulation of their vocal elements, encompassing tone, pitch, volume, and rhythm, is fundamental in conveying emotions and nuanced aspects of their roles (Hokuma Karimova, 2017). This vocal prowess enables the evocation of diverse moods and feelings, endowing depth and complexity to their portrayals (Brundin et al., 2022).

Moreover, the significance of empathy emerges as a defining attribute of proficient actors, allowing them to establish profound connections with the emotions and experiences of their characters, thereby infusing their performances with a profound sense of authenticity. The attainment of a comprehensive understanding of the characters' backgrounds, motivations, and conflicts plays a pivotal role in delivering compelling portrayals. Furthermore, their versatility is exhibited through seamless transitions between divergent roles and theatrical styles, adeptly encompassing comedic, dramatic, or tragic performances (Panero & Winner, 2021). Notably, their skillful embodiment of characters from disparate temporal, cultural, and social contexts further exemplify their prowess as performers (LePage, 2021). The essence of vulnerability assumes a paramount role in acting, necessitating that actors draw from their innermost emotions to portray characters with genuine sincerity (McDonald et al., 2020). This emotional openness and availability during performances contribute substantially to the authenticity and emotive impact of their portrayals. Adequate rehearsal and preparation emerge as critical factors in enhancing an actor's expressiveness (Ohikuaré, 2014). Actors who engage in thorough preparation exhibit a heightened understanding of their characters and the contextual backdrop, culminating in performances characterised by increased depth and resonance (Jorns et al., 1975). Beyond the confines of the stage, an expressive actor establishes a profound emotional bond not only with co-performers but also with the audience. This intimate connection effectively engages the spectators, drawing them deeply into the narrative and ensuring an immersive and captivating experience. The shared communal encounter during live performances transcends individual experiences, engendering a collective and relational phenomenon that interconnects performers and spectators within a specific temporal and spatial framework (Barbour &

Hitchmough, 2014). The realm of dance, and indeed all performing arts, derives its aesthetic impact from the successful transmission of messages between performers and spectators (Orgs et al., 2016). This mutual understanding engenders dance with a powerful and evocative medium for expression and communication.

Friedman (1980) also stated that the expression of affect occurs through facial expressions, tone of voice, gestures, and body movements. Along with extrinsic factors, intrinsic or individual elements are also considered to be affecting performance levels, though the prescribed training highlights the need for control of highly personalised involvement with the act. Individual levels of expressiveness are suggested as a key determinant of the effectiveness of non-verbal communication in Kathakali, however, existing literature has not covered the role of demographic elements and individual training in determining the extent of expressiveness. Hence, the Affective Communication Test (ACT) was incorporated into the current study for obtaining an empirical understanding of individual expressiveness concerning the socio-demographic and training profile of *Kathakali* actors.

What is the Affective Communication Test (ACT)?

The Affective Communication Test (ACT), is a self-report measure of nonverbal emotional expressiveness (Manusov & Patterson, 2006). The measure assesses individual differences in the ability to transmit emotions and to use non-verbal cues to move, lead, inspire or captivate others. A study conducted by Friedman et al. (1980) among 577 undergraduate students showed ACT to be a reliable and valid measure of individual differences in expressiveness or charisma, which is (a) an element of influence in face-to-face social interaction, (b) a basic trait of personality, and (c) a focus point in contemporary nonverbal communication research. It consists of 13 self-report items, and reliably distinguishes individuals on a number of dimensions of social interaction, thereby pointing out individual differences in expressiveness. The respondents are expected to rate each item on a 9-point scale, ranging from -4 to +4 (from "not at all true of me" to "very true of me"). Items 2, 5, 6, 8, 9, and 11 have to be reverse-scored. Five points will be added to each item (to eliminate negative numbers) and the individual items will be summed up to obtain the total score obtained in the Affective Communication Test (ACT).

Objective

To explore the extent of individual differences in expressiveness among *Kathakali* actors of the Redbeard festival.

METHODOLOGY

This study employs Howard S Friedman's Affective Communication Test (ACT), a self-report measure to study differences in individual expressiveness of *Kathakali* actors. 33 *Kathakali* actors who performed in the Red Beard Festival of *Kathakali* in 2021 were selected as participants using a purposive sampling method. ACT was circulated among the participants and quantitative analysis was carried out using SPSS Software (Version 23). Descriptive measures were used to obtain the socio-demographic profile of the participants. As the data were not normally distributed, non-parametric tests including the Mann-Whitney U test and Kruskal - Wallis H test were performed to investigate the extent of individual expressiveness across groups based on gender, age, educational qualification, occupation, and marital status. Spearman's Rank Order Coefficient was calculated to understand the impact of years of training as well as years of experience on individual expressiveness among the participants.

RESEARCH QUESTIONS

- RQ 1: What is the extent of individual expressiveness among Kathakali actors?
 RQ 2: Does gender, age, education, occupation, and marital status impact expressiveness?
 RQ 3: Do the duration of the training and experience of the actor impact expressiveness?

Results

Table 1. Frequency Distribution and Percentages (n=33)

Domain	Category	Frequency	Percentage
Age	16-45 years	22	66.7
	46-75 years	11	33.3
Gender	Male	30	90.9
	Female	3	9.1
Educational Qualification	Higher secondary	7	21.2
	Under graduation	17	51.5
	Post-graduation	8	24.2
	Graduation	1	3.0
Occupation	Student	12	36.4
	Self-employed	15	45.5
	Private sector	4	12.1
	Public sector	2	6.1
Marital Status	Unmarried	11	33.3
	Married	22	66.7
Years of Training	0-5 years	4	12.1
	5-10 years	11	33.3
	Above 10 years	18	54.5
Years of Experience	0-5 years	12	36.4
	5-10 years	2	6.1
	Above 10 years	19	57.6
Total (n)		33	100

Table 1 demonstrates the socio-demographic profile of the participants through frequency and percentage distributions. The sample consists of two age groups, 16-45 and 46-75 years respectively and the majority are males (90.9%). Higher secondary education remains the basic educational qualification and most of them have pursued undergraduate studies (51.5%). A good number of participants are either

self-employed (45.5%) or continuing their studies (36.4%). More than half of the participants (54.5% and 57.6% respectively) have acquired more than 10 years of training as well as experience in Kathakali.

RQ 1: What is the extent of individual expressiveness among *Kathakali* actors?

Table 2 - Descriptive Statistics showing the extent of individual differences in Expressiveness

	N	Range	Minimum	Maximum	Mean	Standard Deviation	Variance
Expressiveness (Total ACT Score)	33	47	70	117	111.55	1.46	8.41

Table 2 illustrates descriptive statistics showing the extent of individual differences in expressiveness among kathakali actors. Findings suggest that the minimum and maximum scores obtained by the participants are 70 and 117 respectively (Mean = 111.55, SD ± 1.46).

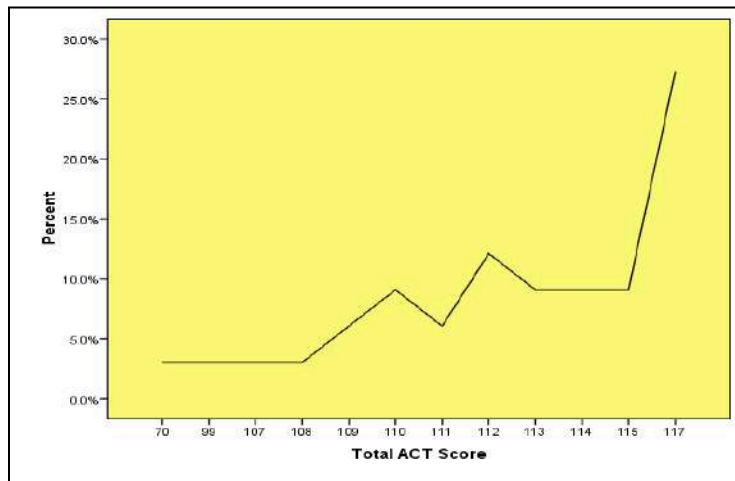


Figure 1. Distribution of scores of Expressiveness obtained through ACT

The distribution of scores obtained for all items of ACT was found to be $p < .001$, suggesting that the data is not normally distributed. Hence, non-parametric tests were preferred for further analysis.

RQ 2: Does gender, age, education, occupation, and marital status impact expressiveness?

Table 3. Mann-Whitney U test comparing Expressiveness based on Gender

Variable	Group	N	Mean Rank	U	Z	Sig.
Gender	Males	30	16.58	32.50	-.79	.42
	Females	03	21.17			
	Total	33				

* $p < .05$

Table 3 demonstrates that there is no significant difference in individual levels of expressiveness across categories of Gender ($U = 32.50, z = -.79, p = .42$).

Table 4. Mann-Whitney U test comparing Expressiveness based on Age

Variable	Group	N	Mean Rank	<i>U</i>	<i>Z</i>	<i>Sig.</i>
Age	16-45 years	22	16.59	112	-.34	.74
	46-75 years	11	17.82			
	Total	33				

* $p < 0.05$

Table 4 demonstrates that there is no significant difference in individual levels of expressiveness across different age groups ($U = 112, z = -.34, p = .74$).

Table 5. Kruskal-Wallis H test comparing Expressiveness based on Educational Qualification

Variable	Group	N	Mean Rank	<i>Kruskal Wallis Chi-Square</i>	<i>Sig.</i>
Educational Qualification	Higher secondary	7	12.93	4.14	.24
	Under graduation	17	16.97		
	Post-graduation	8	21.75		
	Graduation	1	8.00		
	Total	33			

* $p < 0.05$

As shown in Table 5, the Kruskal-Wallis H test performed to compare expressiveness based on educational qualification does not yield any statistically significant differences across groups ($H = 4.14, p = .24$).

Table 6. Kruskal-Wallis H test comparing Expressiveness based on Occupation

Variable	Group	N	Mean Rank	<i>Kruskal Wallis Chi-Square</i>	<i>Sig.</i>
Educational Qualification	Student	12	14.54	3.11	.37
	Self-employed	15	16.83		
	Private sector	4	20.50		
	Public sector	2	26.00		
	Total	33			

* $p < 0.05$

Results of the Kruskal-Wallis H test illustrated in Table 6 shows that there is no significant difference in individual levels of expressiveness based on occupation ($H = 3.11, p = .37$).

Table 7. Mann-Whitney U test comparing Expressiveness based on Marital Status

Variable	Group	N	Mean Rank	<i>U</i>	<i>Z</i>	<i>Sig.</i>
Gender	Unmarried	11	14.64	95.00	-1.0	.31
	Married	22	18.18			
	Total	33				

* $p < 0.05$

Table 7 illustrates that there is no significant difference in individual levels of expressiveness between unmarried and married individuals ($U = 95.00, z = -1.0, p = .31$).

RQ 3: Do the duration of the training and experience of the actor impact expressiveness?

Table 8. Spearman's Rank Order Correlation Coefficient of Years of Training, Years of Experience and Expressiveness

Variable	Years of Training	Years of Experience	Expressiveness
Years of Training	1	.00	.13
Years of Experience		1	.17
Expressiveness			1

* $p < 0.01$ level (2-tailed)

Spearman's Rank Order correlation analysis results, as illustrated in Table 8, suggests that there is no statistically significant association between years of training and individual levels of expressiveness ($p=0.45$) as well as years of experience and expressiveness ($p=0.33$).

SUMMARY & DISCUSSIONS

The range of scores obtained by the participants on the Affective Communication Test (ACT) was found to be 70-117 (Mean = 111.55, SD ± 1.46). Inferential statistical analysis suggested no significant difference in individual expressiveness among participants concerning gender, age, educational qualification, occupation, and marital status. Correlation analysis further indicated that years of training, as well as years of experience, do not have a significant impact on individual expressiveness. The results of ACT pertain to the degree of achievement of success in the depiction of *Bhava* or mood of the performer i.e. before its communication or transference into *Rasa* in the minds of the connoisseur. In other words, it infers that the systematic training of *Kathakali* involving the expression of eyes complimented by movements of facial muscles and dancing suffices the expression of emotional state as far as the proponent is concerned. This is the fact irrespective of age, gender, and duration of training by the lecturer. The actors get satisfied even with short training periods like 3-4 years, though he/she has to go further along in the process, as far as the Art or audience is concerned. There are two distinctly separate aspects to this achievement. One is that the process of analysis of the microstructure of all human relations described in *Natyashastra* has universal appeal. Two, the training process in *Kathakali* has embedded universal aspects of the depiction of the mood demanded by the occasion. That means that effective enacting, based on *Kalari*, is more or less impersonal, i.e. if a specific procedure of physical and

facial enacting is rather mechanically performed, the intended Bhava is fulfilled. This is the classical element of enacting. This means that continuous repressive training imparted reaches deep into the subconscious mind and becomes the habit or behaviour of the proponent. However, the quality of aesthetic involvement of the transference and hence that of *Rasa* might influence the personality or individual talent of the actor. Although the sample satisfied the criterion for statistical analysis, the generalizability needs to be evaluated in a wider population. Covid-19-related restrictions placed a severe constraint on expanding the current sample size. A comparison of individual expressiveness among performers across various cultural, linguistic, and geographic groups may thus be considered an important direction for future research. Mixed method evaluations consisting of both subjective and objective evaluations can also throw light on the characteristics and dimensions of individual expressiveness in Kathakali.

CONCLUSION

In conclusion, the Affective Communication Test (ACT) reveals that the systematic training of Kathakali enables performers to express emotions effectively, independent of age, gender, or duration of training. The impersonal nature of the enactment process, driven by continuous repressive training, allows the intended Bhava to be fulfilled mechanically. The study highlights the universal appeal of emotion depiction in Kathakali, transcending cultural boundaries, while the quality of aesthetic involvement influences the actor's personality and talent, contributing to the captivating essence of this traditional art form.

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Systematic Literature Review On Recycling Waste Cooking Oil Using Public Service Announcement

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ABSTRACT

Cooking oil has attained significant importance and is regularly consumed on a global scale, encompassing both beneficial as well as negative practices. Nevertheless, the management of waste cooking oil (WCO) has been implemented through various methods that have resulted in significant environmental concerns. This article undertakes an analysis of the public service announcement (PSA) campaign aimed at promoting the management of waste cooking oil. This study employs a qualitative methodology and utilises a systematic literature review (SLR) approach to identify relevant scholarly articles pertaining to waste cooking oil. The acquired data is subjected to analysis through the use of a document analysis methodology in order to elucidate the significant information derived from the journal. The screening methodology has identified a total of four (4) articles published between 2019 and 2023 that are relevant to the investigation of the utilisation of public service announcements in the promotion of waste cooking oil. The findings indicate a significant dearth of prior scholarly investigations concerning public service announcements related to the recycling of waste cooking oil. It is strongly advised that future research be conducted to investigate the influence of public service announcements (PSAs) on waste cooking oil, particularly in the context of Malaysia.

Keywords: *Systematic Literature Review (LSR), Public Service Announcement, Creative Advertising, Waste Cooking Oil Management*

INTRODUCTION

Cooking oil, an essential ingredient found in kitchens across the globe, assumes a substantial role in our everyday existence, providing not only culinary advantages but also presenting environmental complexities (Suzihaque et al., 2022). The issue of waste cooking oil (WCO) management has become a

significant concern due to the large volumes generated on a global scale. As the field of culinary practices undergoes development, there is a corresponding emergence of issues pertaining to the disposal and recycling of WCO (Suzihaque et al., 2022).

This study undertakes a thorough investigation of a new strategy to tackle this problem: employing public service announcements (PSAs) as a method to advocate for responsible waste and chemical waste management. During the period characterised by rising environmental awareness, PSAs became known as powerful instruments for enhancing public consciousness and advocating for sustainable practices (Ftanou et al., 2021). This research employs a qualitative methodology by utilising a systematic literature review (SLR) approach to select and analyse academic papers that explore the use of PSAs in promoting responsible WCO management. Our systematic literature review, spanning from 2019 to 2023, has revealed a limited body of research concerning the involvement of PSAs in the recycling of WCO. In spite of the growing significance of ecologically responsible practices, there seems to be a lack of scholarly discourse in this particular field. The lack of study in this area highlights the importance and urgency of our investigation. In the present introductory segment, we shall furnish a comprehensive outline of seminal scholarly articles that have made significant contributions towards developing a more comprehensive comprehension of PSAs, their efficacy, and their impact on diverse behavioural modifications. Furthermore, the present study will address the weaknesses found in the current body of literature, as outlined by Suzihaque et al. (2022).

In order to gain insight into the potential of PSAs in the context of waste and recycling management, we will analyse several scholarly articles. These articles include "Recycling as a planned behaviour: the moderating role of perceived behavioural control" by Liu et al. (2021), "Bi-objective design of household e-waste collection with public advertising and competition from informal sectors" by Shi et al. (2020), "Developing Public Service Announcements to Help Prevent Suicide among Young People" by Ftanou et al. (2021), and "Neuroelectrical indices evaluation during antismoking public service announcements for a young population." In the remaining pages, an in-depth study will be conducted on the previously mentioned studies, covering an exploration of their respective techniques, outcomes, and implications. By means of this rigorous investigation, our objective is to offer a comprehensive comprehension of the present level of knowledge on this particular topic and pinpoint potential areas for future research. As we explore this unfamiliar domain, we recommend an expanded focus on the significance of PSAs in advancing responsible environmental preservation and oversight, particularly within the Malaysian setting, where an intersection of culinary customs and ecological considerations is evident. The subsequent portions of this manuscript will explore the chosen literature, examining its discoveries, methodology, and implications. The systematic literature review conducted by Suzihaque et al. (2022) serves the purpose of providing a comprehensive and informative overview of the topic. Additionally, it contributes to the advancement of future research in the fields of PSAs and WCO recycling. Collectively, we undertake an expedition to investigate the profound capacity of PSAs to confront the environmental obstacles presented by the management of WCO.

LITERATURE REVIEW

Even though many writers have written extensively about creative advertising and PSA, on our part we shall try to gather and examine as much as we can on these subjects from past articles that study PSA efforts on WCO management.

Recycling as a planned behaviour: the moderating role of perceived behavioural control

The study by Liu et al. (2021) examines the effectiveness of PSA video using the theoretical framework of planned behaviour, also known as TPB, in stimulating individuals to adopt appropriate recycling practices. The researchers used a one-way between-subjects experimental design and a diverse

sample of 707 participants in New York State. The study analysed survey responses on attitudes, subjective norms, perceived behavioural control, recycling intention, and demographics.

TPB is developed based on the theory of reasoned action (TRA), which proposes that behavioural intention is a function of attitude and subjective norms. However, the TRA is only confined to predicting behaviours under volitional control (i.e., an act based on the power of one's will). When it comes to behaviours that are not under volitional control, the TRA becomes less useful. That is to say, when people lack the required skills or resources to perform a behaviour, attitude and subjective norms may not predict behavioural intention well. To improve the predictive power of the TRA, Ajzen (2020) proposed the TPB by adding perceived behavioural control as another determinant of behavioural intention.

Not surprisingly, in recycling research, attitude has been found to be the most consistent predictor of behavioural intention (Knussen et al., 2004; Tang et al., 2011). In this research context, people who have a favourable attitude toward recycling are more likely to maintain this behaviour and be better recyclers in the long run. Beyond the recycling context, in a meta-analysis of 185 TPB-based studies, Armitage and Conner (2001) found that attitude accounts for 24% of the variance in behavioural intention, followed by perceived behavioural control (18%) and subjective norms (12%).

The researchers found that the PSA video positively impacts individuals' intentions to recycle by influencing their attitudes towards recycling, especially among those who perceive themselves to have low control over their recycling behaviour. This effect has significant implications for environmental campaigns and highlights the crucial role of perceived behavioural control in influencing the theory of planned behaviour. The study's findings have significant implications for environmental campaigns and the role of perceived behavioural control in influencing the theory of planned behaviour.

Bi-objective design of household E-waste collection with public advertising and competition from informal sectors

The research paper "Bi-objective design of household E-waste collection with public advertising and competition from informal sectors" by Shi et al. (2020) focuses on the issue of effectively managing electronic waste (e-waste) in the context of technological progress and environmental consequences. The paper proposes an innovative methodology for developing effective household e-waste collection systems, integrating public advertising strategies to enhance efficiency and addressing challenges posed by informal recycling sectors. The proposed framework uses a mixed-integer nonlinear programming model to optimise e-waste collection while minimising costs related to network development and advertising campaigns.

The methodology incorporates a decomposition-based, multi-objective meta-heuristic algorithm to extract Pareto solutions, which provide optimal trade-offs between objectives. The authors conduct a case study in Changsha, China, to examine the complex dynamics between network infrastructure investments and public awareness campaigns. The paper's contributions extend beyond optimization and encompass wider consequences for environmental awareness and policy-making. The study highlights the importance of residents' environmental consciousness in shaping e-waste collection campaigns and the significance of its methodology as a valuable tool for policymakers dealing with limited collection networks and informal e-waste collectors, especially in developing nations.

The paper acknowledges potential avenues for further exploration and expansion, emphasising the importance of addressing uncertainties related to informal collection sites and prices. Further research should explore challenges associated with multi-period location and advertising strategies. The research's focus on future research aims to stimulate conversations and advancements in e-waste management and its associated domains.

Developing Public Service Announcements to Help Prevent Suicide among Young People

The primary objective of this research paper is to investigate and address the critical issue of suicide prevention among the youth population in Australia. The study aims to eliminate a spotlight on the various factors contributing to this distressing phenomenon and propose effective strategies to minimise its prevalence. By examining the current state of suicide rates among young individuals in Australia, the research efforts to identify the behind causes and risk factors associated with suicidal behaviors. Furthermore, the paper aims to develop and evaluate the efficacy of PSAs as a potential assistance tool for preventing suicide among this vulnerable demographic. Through a comprehensive analysis of existing literature, empirical data, and expert insights, the study seeks to provide valuable insights and recommendations for policy makers, mental health professionals, and other stakeholders involved in suicide prevention efforts. Ultimately, the research paper attempts to contribute to the existing body of knowledge on suicide prevention and open the way. The present study includes a sample size of 15 individuals, ranging in age from 18 to 24 years, who actively participated in workshops conducted in the city of Melbourne. The primary objective of this research endeavor was to investigate the suitability and relevance of three significant suicide prevention PSAs, namely "Talk to someone," "Find what works for you," and "Life can get better." The participants were actively engaged in the evaluation process, offering valuable insights regarding the content, format, and design of the PSAs. Additionally, they provided their perspectives on the potential impact that these PSAs could have on the target audience.

(11 pt)

The employed methodology for evaluating the study is qualitative in nature, mainly relying on workshop discussions and direct input obtained from the participants. The results of the study indicate that the younger participants showed a positive perception towards all three PSAs, considering them to be valuable and beneficial in nature. Notwithstanding, there have been raised concerns regarding the suitability of these treatments for non-western cultural groups, the potential risk of minimizing psychological distress, and the accidentally recommendation of unattainable or remote actions for young people dealing with suicidal ideation.

The present study is related to the overarching subject of formulating successful suicide prevention tactics, with a particular focus on the adolescent demographic. By actively engaging the target demographic in the developmental phase, the study aligns with the overarching goal of formulating messages that are both relatable and influential. The qualitative evaluation approach places significant emphasis on the capture and analysis of personal perspectives and experiences. This is done to ensure the effectiveness of PSAs in establishing a meaningful connection with the intended audience.

Neuroelectrical Indices evaluation during antismoking Public Service Announcements on a young population

This research study seeks to examine the effects of anti-smoking PSAs on individuals' electroencephalographic (EEG) rhythm variations (Modica et al., 2017). It is important to note that a significant proportion, specifically 90%, of individuals initiate smoking before the age of 18. By investigating participants' responses to these PSAs, we aim to gain insights into the potential impact of such interventions on smoking behaviour. The utilisation of EEG technology allows for the measurement and analysis of brain wave patterns, providing valuable data on the neural processes underlying individuals' reactions to anti-smoking messages.

The study employs a quantitative approach, wherein PSAs are classified into three categories: effective, ineffective, and awarded, based on their communication style. Neuroelectrical indices, such as the effort index and approach withdrawal index, are commonly employed in the field of cognitive and affective neuroscience to assess and measure cognitive and affective responses. These indices provide valuable insights into the underlying neural processes associated with various cognitive and affective states. By quantifying and analysing neuroelectrical signals, researchers are able to gain a deeper understanding of the intricate interplay between cognition and the present study incorporates the utilisation of analysis of variance (ANOVA) and logistic regression techniques to investigate the

variations in responses and EEG signals across various types of PSAs and among participants with diverse smoking attitudes. The present study employs a multidisciplinary approach by integrating principles derived from the fields of neuroscience and experimental design. Its primary objective is to evaluate the effectiveness of PSAs by examining the reactions and responses of a specific target audience, namely the youthful demographic. By employing a rigorous methodology, this research aims to provide valuable insights into the impact and efficacy of PSAs in influencing the attitudes and behaviours of young individuals.

RESEARCH METHODOLOGY

This article studied PSA efforts on WCO management through a systematic literature review (SLR). The main objective of a systematic literature review (SLR) is to enhance the understanding of the existing scientific information and research efforts concerning ecosystem services and their significance in maintaining human well-being. Additionally, this study aims to identify the primary limitations and shortcomings that limit the assessment of ecosystem services, while also suggesting a direction for future research efforts in this domain (Mengist et al., 2020). Del Amo et al. (2018) described Systematic Literature Review (SLR) as a thorough and objective approach used to systematically identify, assess, and combine the available database of finished and documented research, scholarly contributions, and practical work conducted by researchers, scholars, and practitioners. To perform a systematic literature review, this study uses four main phases: plan the review, execute the search, analyse the research choices, and present the results. These steps are also known as SALSA: search, appraisal, synthesis, and analysis (Dewey & Drahota, 2016).

Studies on literature selected from the last five years, ranging from 2019 to 2023, were conducted to obtain the latest information about PSA in the WCO management campaign process. The selection of keywords was based on the objective that had been decided. The suitable keywords for the search procedure were chosen based on the objective. This study employed sophisticated manual searching on four major databases: Web of Science, IEEE, Scopus, and ProQuest Search. In their advanced keyword search, the researcher additionally used the phrase searching function and the Boolean operator or/and to combine terms. The keywords that have been used are "Public Service Announcement (PSA)" and "Creative Commercial" and "Waste Cooking Oil (WCO)."

This study aimed to explore the current situation regarding creative advertising efforts through PSAs used in WCO management. To conduct this research, the researcher sets one objective: to identify past public service announcement efforts relating to WCO management. To answer the objective, researchers ask one question: What is the current practice of creative advertising in promoting WCO management campaigns?

FINDINGS

Table 1 shows the electronic databases that have been used for this study, namely Web of Science, IEEE, Scopus, and ProQuest. The present investigation was conducted in the year 2023. In order to maintain an expectation of outstanding performance, this study exclusively incorporated peer-reviewed materials that contained finished research or surveys pertaining to PSA initiatives on WCO management between the timeframe of 2019 and 2023. A total of six hundred and twenty two ($n=622$) papers were obtained. The abstracts were thoroughly reviewed in order to identify the papers that were relevant to the research purpose. The papers should provide an up-to-date analysis of the current state of affairs pertaining to the use of PSAs in the promotion of cooking oil management. Ultimately, only four publications met the established criteria for admission. Table 2 provides a concise overview of the review papers that have

satisfied the established criteria. The concluding stage of the review entailed the synthesis of findings derived from the papers that were incorporated into the study.

Table 1 Summary of Research Result

Items	Data Summary			
	Electronic Data Base	Search Result	Include	Relevant Paper
1	Web of Science	382	63	3
2	IEEE	197	21	1
3	Scopus	1	0	0
4	ProQuest	42	2	0

Table 2. Summary of Research Result

Items	Summary Data			
	Authors	Objective	Design & Development Methodology	Evaluation Method and Data Capture
1	Liu et al. (2021).	The study examined a PSA video's recycling effectiveness using planned behaviour theory. PSAs promoted proper recycling in New York State. The video emphasised recycling's benefits, proper recycling, and community efforts. The video's script stressed recycling correctly and following local guidelines. Researchers used a one-way between-subjects experiment to test their hypotheses. Participants were randomly assigned video or control.	Experimental	<p>An effective recycling PSA video is assessed using theory of planned behaviour (TPB) variables. Attitude, subjective norms, and perceived behavioural control affect recycling intention. The video, attitude, and recycling intention are mediated by perceived behavioural control in the study.</p> <p>A representative sample (N = 707) of New York State residents is surveyed. Ipsos Knowledge Panel® recruits. Attitude, subjective norms, perceived behavioural control, recycling intention, and demographics are surveyed. Participants join PSA video or control groups. From January 14 to 29, 2021, responses will be collected.</p>
2	Shi et al. (2020)	This study aims to develop efficient electronic waste collection systems by integrating public advertising and addressing challenges from the informal sector. It aims to achieve cost reduction, environmental consciousness enhancement, and	Mathematical Modelling Case Study Meta-heuristic Algorithm	<p>This research evaluates network expansion-advertising balance using multi-objective metaheuristic to identify Pareto solutions for optimising collection efficiency and reducing costs.</p> <p>This paper analyses data from a case study in Changsha, China, focusing on costs, environmental awareness, and</p>

		a harmonious equilibrium in developing nations.		informal collection sites. The data aids in developing modelling and simulation techniques, enabling informed decision-making and practical context.
3	Ftanou et al. (2021)	The study emphasizes how crucial it is to involve youth in the production of suicide prevention PSAs in order to ensure their relevance and efficacy. It implies that collaborating on message design with young people might result in more specialised messaging. Despite their particular focus on campaigns for the management of WCO, the findings point to the need for more research to evaluate the impact of these PSAs.	Qualitative	<p>The three suicide prevention PSAs were well-received by the participants, but they expressed concerns about their cultural relevance, the potential trivialization of psychological suffering, and the effectiveness of the suggested actions. They emphasised the value of including young people's inspirational stories.</p> <p>Workshops were used in the project to acquire qualitative information about participants' perceptions of the effectiveness and suitability of the PSAs, which were then improved for further assessment.</p>
4	Modica, E., et al. (2017)	This study examines the impact of anti-smoking Public Service Announcements on individuals' EEG rhythms, aiming to understand their cognitive engagement and emotional responses, and provide insights into their effectiveness.	Quantitative Experimental Design	<p>The study evaluates EEG rhythm variations, Effort Index, and Approach Withdrawal Index responses to different smoking attitudes and types of smoking, examining their variation in relation to perception and engagement.</p> <p>Young high school students show higher effort values for images and videos, indicating difficulty understanding stimuli, and differ in perception based on communication styles.</p>

The main obstacle found in this study related to the difficult task of obtaining relevant research papers from the past that were associated with the subject matter at hand. A total of 622 research papers have been published throughout the time frame of 2019–2023 across four electronic databases. However, there are only four relevant papers that are directly related to the chosen research subject. A considerable quantity of papers, specifically 86 papers, were incorporated into the study. However, their inclusion is considered irrelevant because of their diverse subject matter, which encompasses several fields of study such as chemical and physics response, politics and culture, law, and media. The previously mentioned categories are not aligned with the primary study focus, which encompasses PSA, WCO, sustainability, and/or recycling. This observation highlights a significant deficiency in the existing body of research, specifically the lack of scholarly discussion on the topics of PSA and WCO.

Two scholarly articles, named "Recycling as a planned behaviour: the moderating role of perceived behavioural control" and "Bi-objective design of household e-waste collection with public advertising and competition from informal sectors," have been identified as highly relevant to the research field. These studies investigate the intricate dynamics involved in fostering deliberate recycling behaviours and improving public advertising techniques for waste management. The combination of findings from these academic publications underscores the potential effectiveness of tailored PSAs in shaping individuals' intentions and actions related to recycling.

However, in spite of the valuable insights offered by these articles, there exists a noticeable void in research relevant to the recycling of WCO through PSAs. The current body of literature primarily centres on the collection and recycling practices of electronic trash (e-waste) in general. However, there is a noticeable lack of scholarly investigation relating to the specific domain of waste collection and organisation (WCO) management. The presence of this research gap highlights the need for more investigation into the design, execution, and outcomes of PSAs that particularly target the recycling of WCO.

DISCUSSION & CONCLUSION

The discussion starts by looking into the difficulties encountered in carrying out this systematic literature review. One of the primary difficulties encountered was the limited availability of research specifically relating to PSA efforts in WCOs. Despite conducting an extensive search across major electronic databases, the number of relevant papers that were discovered was found to be low. The limited availability of resources can be related to several variables, including limitations in search algorithms, challenges in database categorization, and the possibility of finding false titles or abstracts in certain publications.

Among the limited literature available, two publications were identified as important due to their relevance to the larger discourse on recycling behaviour and public advertising methods. The articles provide insights into the possible influence of PSAs on recycling behaviour and trash management. Nevertheless, the previously mentioned research generally centred its attention on general recycling behaviours and e-waste collection, respectively, without looking into the unique details of WCOs and their management.

The primary focus that arose from our discoveries is the necessity for additional investigation and examination of PSAs within the framework of WCOs and their management, especially related to the recycling of WCO. The current body of literature offers useful insights into the broader domain of recycling behaviour and public advertising. However, it falls short in fully addressing the different challenges and opportunities found by WCOs in their efforts to promote responsible management of WCOs. Future research efforts should be directed towards addressing this gap in knowledge by examining the design, execution, and effects of customised PSAs that specifically focus on promoting the recycling of waste cooking oil within the domain of conservationist organisations. This research has the capacity to generate substantial contributions towards the goals of environmental sustainability, enhancing public awareness, and safeguarding the integrity of our natural ecosystems.

In conclusion, our systematic literature review has identified a lack of existing research in this particular domain. However, this highlights the significance of further investigation into the efficacy of PSA as a means of promoting responsible WCO management within nature preservation organisations. As the effort to safeguard and conserve our natural environment remains, there is a notable prospect for further investigation and environmental activism in understanding and utilising the power of PSAs.

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Visual Art Education Innovative Learning and Teaching Approach in Secondary School

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ABSTRACT

Learning and teaching in the 21st century have undergone tremendous process due to technological impact on the students and their learning process. The main purpose of this study is to review two academic articles regarding the issue and discussion brought about innovative learning in Visual Art Education subjects in secondary schools in Malaysia. In detail, the articles discussed the uses of technology and gamification methods to enhance the teaching and learning of Visual Art Education, particularly within the secondary school context. Therefore, the articles were chosen based on criteria that were published from 2019 until 2021, and the background of the articles covered the study in Malaysia. Contrary to what has often been assumed, the findings demonstrate that creative and innovative approaches are much more beneficial compared to conventional learning and teaching in school, thus bringing upon research centred in innovative learning around gamification that has emerged as a powerful platform for education making it more fun and effective.

Keywords: *Innovative learning, Visual Art Education, Secondary school, Technology, Gamification*

INTRODUCTION

21st-century education requires a creative and innovative approach to learning and teaching, far apart from a conventional approach that depends on teachers and textbooks. The educational system nowadays should empower learners with skills, competence, and adaptability in a constantly changing landscape. Hence, the learning and teaching approach should equip with a 21st-century mindset and associate pedagogical innovation as it is an approach that focuses on developing students' creativity, and confidence, encouraging indentation, and fostering active problem-solving (Saavedra & Opfer, 2012).

The emergence of new technology has reshaped the field of education and made the learning process more enjoyable (Raja and Nagasubramani, 2018). The use of technologies such as videos, digital cameras, projectors, software, and PowerPoint has come aboard in ICT use to create new aspects of

learning in education (Ebrahimi and Jiar, 2018). According to Richtel (2010), students nowadays face distractions and become unproductive, but cell phones and laptops are a constant pleasure-seeking that offers a new challenge to focus on learning. Although teachers can develop different kinds of learning environments, it is also essential to disseminate effective use of technology on a big scale for change (Agélli Genlott et al., 2019). An innovative approach is vast; hence this article review is conducted to explore a few approaches that are non-conventional in the context of Malaysia's schools.

An article review is a critical constructive analysis of the literature in a specific field through summary, classification, analysis, and comparison (Mayer, 2009). The process of conducting this article review is for the purpose of getting a clearer idea and picture of current trends and issues regarding technology utilised in the Visual Art Education subject in secondary school that was researched and discussed by the previous researcher. This review also ensures careful consideration in knowing the current trend that will enhance the knowledge about the topics in the context of Malaysia that will subsequently guide for future research.

RESEARCH METHODOLOGY

In this overview, the researcher reviewed articles within 2019-2021 published in journals and websites. The article search was applied to the following databases: Google Scholar and ResearchGate. The article selection is based on the inclusion criteria which is a non-conventional learning and teaching approach in Visual Art Education and research in the context of Malaysia. Non-conventional approaches are looking into adopting technology or games. Meanwhile, the exclusion criteria considered are the content of the references is outside of the scope of this study. The following figure shows the flowchart of the method of this study.



Figure 1. Flowchart of method

The article selection was organised in the following phrases:

1. Search for publications from online databases. The first search is the combination of keywords: “Visual Art Education”, “Technology”, and “Malaysia”
2. Limited the time frame of articles listed from 2019 to 2021
3. Exploration of title, abstract and keywords.
4. A complete reading of articles has not been eliminated – determining which are to be excluded from the review according to exclusion criteria.

The primary search generated 15,000 results of relevant references (articles, journals, and dissertations). After eliminating duplicates and articles that are not related to the review, 32 references were identified. Then, 30 references are eliminated after further review due to being full dissertations,

locked articles, and not fully relevant to the research area. Among the papers, the 2 articles were reviewed and included in the study (see Table 1).

Table 1. Relevant articles reviewed in the study

	First author	Year published	Study location	Subject / sample	Method
1	The Development and Evaluation of an Interactive Multimedia Module for the Topic of Art Elements of the Visual Art Education Subject				
	Harozila Ramli	2019	Fakulti Seni, Komputeran & Industri Kreatif, Universiti Pendidikan Sultan Idris	30 Form-One students (15 girls and 15 boys, with a mean age of 13) from secondary school in Temerloh, Pahang.	Develop interactive multimedia learning module (ADDIE Model) Evaluate effectiveness – Case Study (Pre-test post-test control group)
2	Integration of Theatre Game Approach in Visual Art Education at the Secondary School Setting				
	Mohd Zahuri Khairani	2020	Sultan Idris Education University, Malaysia & University of Malaya, Malaysia.	a) Students of Form 1 (Sekolah Menengah Kebangsaan Sultan Azlan Shah) b) 1 Visual Art Education teacher c) 1 Officer (Ministry of Education) d) 3 Lecturers	Case study – data collection method (Observation, interviews, and visual analysis)

FINDINGS

A total of 2 articles were chosen out of 32 found on primary search on Google Scholar which both have evaluated innovative approaches that can enhance learning and teaching while one article developed the technology to be applied and tested in their research. A study done by Harozila et al. (2019) evaluated the effectiveness of the interactive multimedia module through developing the module using the ADDIE model and testing it on 30 Form-One students. On the other hand, the study by Mohd Zahuri et al. (2020) explores the potential of theatre games to be integrated into Visual Art Education through a case study. The 2 articles are analysed through 5 classifications: objective, issues, process, results, and conclusion (see Table 2). The analysis shown in Table 2 is to derive the information and details in the article which will then be discussed in the discussion sector.

Table 2. Studies of the article reviewed

[1] The Development and Evaluation of an Interactive Multimedia Module for the Topic of Art Elements of the Visual Art Education Subject	
Objective	a) Develop and design an interactive multimedia module for the topic Elements of Art of VAE subject.

	b) Evaluate the effectiveness of the module on students' learning performance.
Issues	The researchers are concerned about the lack of student participation in learning VAE. Hence, multimedia was chosen due to its benefit in improving student's motivation and learning performance.
Process	The researcher carried out the development stage in creating the multimedia interactive module using the ADDIE model (5 phases – analysis, design, development, implementation, and evaluation). The design of the learning module adopted several theatrical principles of behaviourism, cognitivism, and constructivism. After the module was developed, the evaluation was done through pre-test and post-test comprised of 50 multiple-choice questions distributed to two types of groups: experimental (using module) and control (using the conventional method).
Result	The results of the case study are reported through 3 tables: Percentage score of experimental groups, percentage score of a control group, and the result of t-test and descriptive statistics of the pre-test and post-test of both groups. For the experimental group, the higher percentage shows that the students understand more through learning using the module created while a slight decrease in the understanding of the students in the control group that is learning through the conventional method. The pre-test score analysed to show that both groups consist of the same learning intervention, however the post-test score analysed afterward clearly indicates that the interactive multimedia learning module is highly effective compared to the conventional method of learning.
Conclusion	The researcher concludes the study with firmly reasoning that a multimedia interactive learning module is a tool that can enhance learning efficacy through presenting and explaining the concepts in various formats such as animation, 3D graphics, or video. All individuals and organisations should try to incorporate technology into teaching culture which will become an integral part of teaching and learning.
[2] Integration of Theatre Game Approach in Visual Art Education at the Secondary School Setting	
Objective	To highlight the importance of theatre games in learning VAE
Issues	Theatre games in learning and teaching is a creative approach however the research in this area particularly visual art education is scarce and unfamiliar to individuals teaching and learning VAE.
Process	The theatre games employed are Improvisation, Atomic Exploding, Magic If, and Actor Toolbox after consulting and interviewing senior lecturers in theatre Education, participants (visual art teachers, students, a lecturer, and an officer from MOE). The researcher identifies the method of learning and teaching from the Lesson Plan provided by the Visual Art Teacher and information from document analysis. The data collected through the interview, observations, and documents are analysed through The Nested Model and characterised the data into 4 categories: objectives, questions, targets, and methods. The researcher also analyses the theatre games performance and learning behaviour.

Result	The result is shown in two sectors: suitability of integrating theatre games in VAE and integrated learning method-based theatre games in VAE for lower secondary students. First and foremost, data obtained about the theatre games were tested and justified that it corresponded well with learning and teaching activity. The theatre games also provided joy in learning and teaching workshops thus increasing student participation and deep learning outcomes. The second sector further discusses the integration of theatre games with firstly teachers have to adopt a role-play approach while implementing the theatre games and the student's enthusiastic participation is influenced by their teacher participation, theatre games, and themselves. Theatre games were also found to develop students as active learners and enhance their ability to express creative ideas freely. Moreover, the skills that consist within the theatre games are a basis for 21st-century skills and lifelong learning skills.
Conclusion	With proper planning, the approach of theatre games is beneficial for students and teachers can use various approaches that enable students to be active, engaged, and collaborative. Although theatre games resulted in more engaging learning, it is not widely adopted due to the limitation of art teachers: knowledge skills, practised time. Through theatre games, students were able to work together, enjoy and gain enhanced learning outcomes.

DISCUSSION

The study by Harozila et al. (2019) and Mohd Zahuri et al. (2020) has both done intensive research on the effectiveness and the impact of non-conventional approaches in VAE subjects within the context of secondary school in Malaysia. Harozila et al. (2019) has discussed earlier in the study where various researcher has to argue the potential and benefits of ICT in education (Maulan and Ibrahim, 2012, Hassan Mohd Ghazali, 2000, cited in Harozila et al., 2020) and visual art education (Gregory, 2009; Taylor, 2007; Loveless, 2003, cited in Harozila et al., 2020). Similarly, Mohd Zahuri et al.(2020) also considers the benefits of the gamification learning approach where in this case, theatre games can convert reality into new worlds, enable students to reflect and expand their imagination, and motivation for learning (Bany-Winters, 2012; Way, 1998; Landy and Montgomery, 2012, cited in Mohd Zahuri et al., 2020). Although beneficial as it is, the implemented approach has also been surrounded by issues, external or internal. Ramli has discussed the lack of technology would create an ineffective process (Harozila et al., 2019, cited in Harozila et al., 2020) while Mohd Zahuri et al.(2019) state that the theatre game approach is underexplored and can be challenging (Schonmann, 2006; Mayra, 2000, cited in Mohd Zahuri et al., 2020).

An innovative approach in education is the current trend of teaching and learning as it is unique and can be responsive to ever-changing conditions. As of now, the implementation, research, and discussion on any contemporary approach that can be input within education are increasing. Harozila et al. (2019) state that Malaysia has been focused on integrating ICT into the Visual Art Education Curriculum (VAEC) and Mohd Zahuri et al. (2020) discuss theatre games that can act as a stimulus and innovative approach for continuous learning. In fact, in the current period, education 4.0 requires innovation, much on student-centred learning, and a flexible approach that can revolutionise teaching and learning. The potential of both approaches and their impact are clearly defined positively as the students are much more active in learning and motivated.

Furthermore, the pre-test and post-test conducted by Harozila et al. (2019) have been analysed and their results show an increased performance of the students who learn through interactive multimedia learning modules. Observations made by Mohd Zahuri et al. (2020) during the study also show similar findings in which students are actively learning and increasing in creativity. The theatre games conducted in the workshop being observed also found out that apart from creating joy among students, their enthusiasm was influenced by the active involvement of the teachers. This shows that the effectiveness of the approach can be measured not only from student involvement but also from the influence that came from teachers participating during the process.

Last but not least, this is the gap that has been found in the study done by Harozila et al. (2019) where the researcher hasn't clearly defined the process and participation of the art teachers involved during the study. However, Harozila et al. (2019) does generally inform in the recommendation section for art teachers and possible problems faced when incorporating the technology. On the other hand, the study by Mohd Zahuri et al. (2020) has filled in the research gap about the lack of focus on 21st-century learning skills in visual art education and is sufficiently supported by various arguments and information about innovative approaches (Schonmann, 2006, cited in Mohd Zahuri et al., 2020), integrated learning (Mohd Zahuri and Mohamad Sayuti, 2019, cited in Mohd Zahuri et al, 2020) and the benefits of theatre games as learning and teaching tool (Bany-Winters, 2012, cited in Mohd Zahuri et al, 2020).

CONCLUSION

This article review is focused on studying the utilisation of innovative approaches for teaching and learning in visual art education, particularly in secondary school. Apart from reviewing the findings, this article review has also analysed the method, discussion, and process of the study. Overall, based on the reviewed article, technology and gamification must prove their standing in benefiting the student and teacher through motivation, active participation, and the process of teaching and learning. However, the adopted approach also came with interest and infrastructure limitations according to Harozila et al. (2019) and Mohd Zahuri et al. (2020). Therefore, every individual and organisation should overcome internal and external problems so that integration can be implemented fluidly to enhance both learning and teaching.

To conclude, a non-conventional and innovative approach to education is very suitable for the current generation of learners due to their surrounding area filled with technological appliances, making it much easier to implement and further pique their interest in learning the VAE subject. Gamification has emerged as a powerful platform for education learning where gamification can make learning fun and effective. Moreover, adding gamification during the teaching and learning process can increase student participation as it requires them to be active thinkers thus easier for the student to understand.

Brett Trill (2008) cited in Gatta et al. (2015) frequently talked about gamification and described it as "taking game mechanics and applying them to other web properties to increase engagement." Previous research has established that the concept of gamification is the use of game design elements in non-game contexts (Deterding et al., 2011) and the use of "game-based mechanics, aesthetics and game thinking to engage people, motivate action, promote learning, and solve problems" (Kapp, 2012). To date, several studies have investigated gamification both in practice and in field study (Dichev and Dicheva, 2017). The concept was first coined in 2002 by Nick Pelling and became well-known in the second half of 2010 due to the effect of the conference and players. Furthermore, as stated by Deterding et al. (2011), Marczewski, Werbach & Hunter, and Zichermann and Cunningham, researchers interpreted gamification in a dissimilar way of study (Welbers et al., 2019)

According to Zichermann and Cunningham (2011), gamification is the game mechanics and thinking to engage users and to solve issues. The base idea of gamification is the application of game elements that can make the education experience more engaging and effective. Certain game elements are effectively effective in learning. Welbers et al. (2019) found that Malone (1982) uses game elements designed for featured computers to make them applicable and enjoyable. The article reviewed in this study helps in giving deeper insight into the possibility of innovative approaches such as theatre games and interactive multimedia learning modules enhancing and beneficial for learning and teaching VAE subjects in secondary school.

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The Open Space Office and the Relationship with the Shift in Social Meaning

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ABSTRACT

The development of the organizational structure is necessitating additional office space. However, not all offices are inclined to expand their spatial resources. Those designed with a closed layout face challenges in meeting the spatial demands posed by the evolving organizational structure. In such cases, transitioning to an open-space office design presents a viable solution. On the other hand, the transition often gives rise to issues pertaining to the social dynamics between leaders and employees, as it disrupts established traditions, leading to a shift in the perceived significance of office space. Understanding this shift within the workplace requires an effective examination of the empirical phenomenon. Moreover, it demands a strong theoretical foundation to develop a precise conceptual framework. Design science serves as a problem-solving approach, addressing the physical elements of structural organization systematically to achieve desired outcomes. This problem-solving process is intricately connected to how individuals respond to their workspace. One of the key design challenges revolves around spatial users and their proximity. The proximity is closely intertwined with the requirements for personal spaces, which significantly impacts privacy. Achieving this balance is accomplished through the application of ergonomic principles and the understanding of proxemic distances. This study used the design method and integrated design thinking theory into the strategic process. The primary objectives of the analysis were twofold, including (1) to reconsider traditional design approaches based on absolutes of right or wrong, likes or dislikes, suitability or unsuitability, and precision or imprecision, and (2) to embrace changes aimed at enhancing the existing workspace without expanding the spatial area while ensuring a seamless workflow for employees.

Keywords: *Interior Design, Open Space Area, Social Meaning, Teamwork.*

INTRODUCTION

Humans, as social beings, are integral to culture, implementing facts and procedures with both uniformity and differences in the establishment of empirical laws and definitions. This process generates social meaning corresponding with human ideas and actions, and results in cultural objects rooted in agreements that evolve with changing times (Bell, 2023; Sugiharto, 2023; Bakker, 2022; Koentjaraningrat, 1987). Culture, as a value system, articulates its way of thinking through symbols. These symbols, serving both communicative function and holding intrinsic value, are intertwined with the substance that accompanies the ideas presented.

There is a cultural system that delineates what is important and valuable in life. This functions as an action system of higher significance in society, with values deeply ingrained in mentality. The expression of cultural thought through symbols is inseparable from its meaning, which continuously evolves without always achieving complete understanding. Therefore, a plethora of interpretations has become widely available (Sugiharto, 2023; Agustianto, 2011; Wardani, 2010), and the shift in social meaning is an inseparable part of culture, altering pre-existing traditions. The transformation of the organizational structure significantly affects spatial requirements. Closed office layouts often fall short of meeting these needs, and not all offices can expand the workspace as the organizational structure develops. While transitioning to the open space design is an ideal solution, it often causes challenges related to the social meaning of leaders and employees. This transformation poses questions about whether tradition can be altered. Primarily, tradition is not an immutable concept but rather a product of human decisions. When office design undergoes changes, a shift in tradition is unavoidable. An in-depth understanding of empirical phenomena is crucial to explain the transition toward open office spaces.

The shift in the social meaning of an office and changes in the system of arrangement can be attributed to limited land availability and the need for increased collaboration in the form of teamwork (Privett, 2020). Although modernity introduces innovative logic in terms of novel meanings, demands, and opportunities, it does not alter the social meaning of the workplace in the context of overarching culture (Djadjuli, 2017). The overexposure of a culture is a foundation for solid bastion of identity, characterized by rigidity, reluctance to adapt, and an inclination to view outsiders as adversaries who should be opposed or destroyed. This phenomenon is characterized by a shift from a closed system to the open system, resulting in contested transformation. This raises the question of why openness is considered a challenge to be undermined, and whether leadership undergoes a transformation in social meaning when the workspace of leaders becomes open without barriers.

The transition to the open space office arrangement should not inherently cause a shift in social meaning. Therefore, addressing empirical phenomena and cultivating a solid theoretical foundation are the initial steps toward achieving this objective. The design method and thinking theory are also ideal solutions. Interior design science, as a systematic process for addressing issues related to the physical components of a structure, enables the attainment of primary objectives (Juliá Nehme, 2020; Dewi, 2018; Hidjaz, 2011; Santosa, 2005).

LITERATURE REVIEW

Interior Design Science

The primary objective of interior design is to address complex problems related to human responses to space. This process is carried out methodically, producing a design concept of four key components, namely design object, user, new idea, and corporate image, with user needs playing a crucial role in the preparation phase. Humans, as users, interact with various elements within a space, including floors, walls, ceilings, windows, doors, and furniture, resulting in a unique spatial experience (Sari, 2005).

Spatial users are influenced by two main dimensions, namely ergonomic-instrumental and affective. Ergonomic-instrumental is a product of structuring the workspace with an ergonomic design. This includes the provision of work desks and chairs tailored to the body size of the user, as well as functional lighting. The provision of relaxation facilities, such as lounges, can be categorized under this dimension. On the other hand, affective dimension pertains to emotions and feelings. The ambiance of the office space is integral in shaping the behavior and activities of users. Interior spaces are designed to enhance environmental conditions, leading to more effective and efficient user activities.

Effectiveness is achieved through the optimization of space efficiency and the presentation of an aesthetically pleasing visual appearance. The interior design process comprises two main stages, namely the idea proposal and the design solution. Idea proposal is carried out through data collection, problem identification, discussions, and the identification of issues. Space requirements and zone division are the outputs of this phase. Design solution, on the other hand, builds upon the existing proposal, including the creation of furniture layouts based on zone divisions and the development of comprehensive working drawings to guide fieldwork. Furthermore, the guidelines for on-site work are closely related to the anticipated costs, calculated based on working drawings, material selection, and selected furniture. A systematically executed design process can lead to the resolution of issues that are both appropriate and beneficial for the users.

Proxemic

One of the challenges of the design relates to spatial users, with a particular focus on the concept of proximity, which is intricately related to the need for personal areas directly impacting privacy. This consideration is guided by the application of ergonomic principles and proxemic distances. Proxemic addresses how individuals perceive and use space in communication. The four proxemic zones are:

1. Intimate distance of 0-46 cm
2. Personal distance of 46 cm - 120 cm
3. Social distance of 120 cm - 360 cm
4. Public distance above 360 cm

The zones serve as a framework for understanding the interactions between individuals and the physical environment, offering guidance for shared spaces. Also, the arrangement and spacing of shared spaces are closely intertwined with furniture design, an important element in the context of physical settings. Interior designers can identify optimal and comfortable distances for users by using a guidebook. Below is a visual display of a meeting room layout.

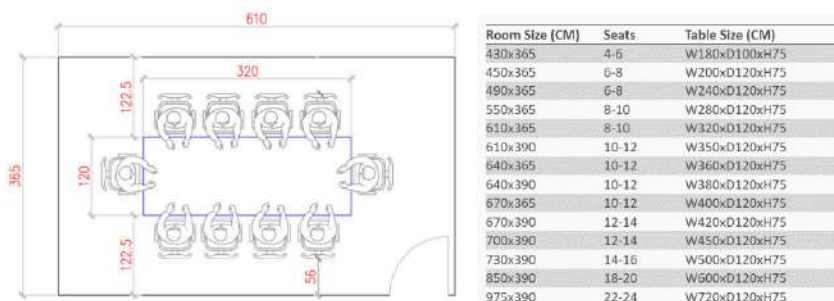


Figure 1. Circular conference table.

(Source: <https://workspace.ae/content/meeting-table-size-guide>)

RESEARCH METHODOLOGY

The concept of culture can be applied to address challenges related to the social culture in meeting space requirements. Analyzing the culture and systems in the office with closed design models is a crucial step to ensure that design changes do not negatively impact employee performance. The design method, based on Rosemary Kilmer theory, was adopted, with the process classified into two distinct stages. The first stage comprised data collection, problem identification, and discussions to find solutions. The second stage, known as synthesis, was dedicated to processing the formulation of problem-solving strategies to yield a design solution output. The entire process was driven by Design Thinking theory guiding the creative strategy process.

FINDINGS

The concept of renovating the second-floor workspace of the Annex Building of the Protocol Bureau commenced with a headcount of employees. The subsequent step included dividing the area into the main and supporting sections. The main area consisted of a workspace with a closed room for the strata 1 leader, the open space room for the strata 2 leader, and a staff work area. The supporting area included a file area and a lounge. The new standardization was implemented without reducing the existing facilities.

Table 1. Space standardization

No	Space	Space Requirement	Wide
MAIN AREA			
1	Head of Bureau (Strata 1)	Work desk and chair Small meeting desk Sofa set File cabinet	42 sqm.
		Restroom and bathroom	10 sqm.
2	Head of Section (Strata 2)	Work desk and chair Sofa set Lemari file	14.2 sqm.
3	Head of Subdivision (Strata 3)	Work desk and chair Sofa set File credenza	10.5 sqm./ 3 people
4	Staff	Work desk and chair Sofa set File cabinet Storage credenza	10 sqm./ 6 people
5	Non-civil servants	Work desk and chair (open space)	8.5sqm./ 4 people
6	Hot Seat	Work desk and chair (closed space)	9.5sqm./ 4 people
7	Bureau Head Staff	Work desk and chair Sofa set for Bureau Head guests File cabinet	9.5sqm.
SUPPORT AREA			
8	File, print, photocopy area	Credenza	
9	Lounge	Sofa set	20 sqm.

The first stage comprised the calculation of work area requirements based on the needs of employees. This required determining the necessary area by multiplying the area per room by the number of employees and considering any requirements for additional space. The next stage included determining the circulation area by adding 20% of the initial calculation. The circulation path adhered to a standard width of 120 cm, designed to accommodate two people walking together, and 150 cm for the main

circulation path. This path played a crucial role in ensuring safety in the event of fire or earthquake. The table above shows the adjustment results standardizing the space based on the results of data analysis. The second stage comprised mapping the work area based on the desk division, while the third stage entailed creating exposure images that visually conveyed the ambiance of the office. Subsequently, the process proceeded to the stage of transforming the proposal into a design solution.

Interior Design Concept

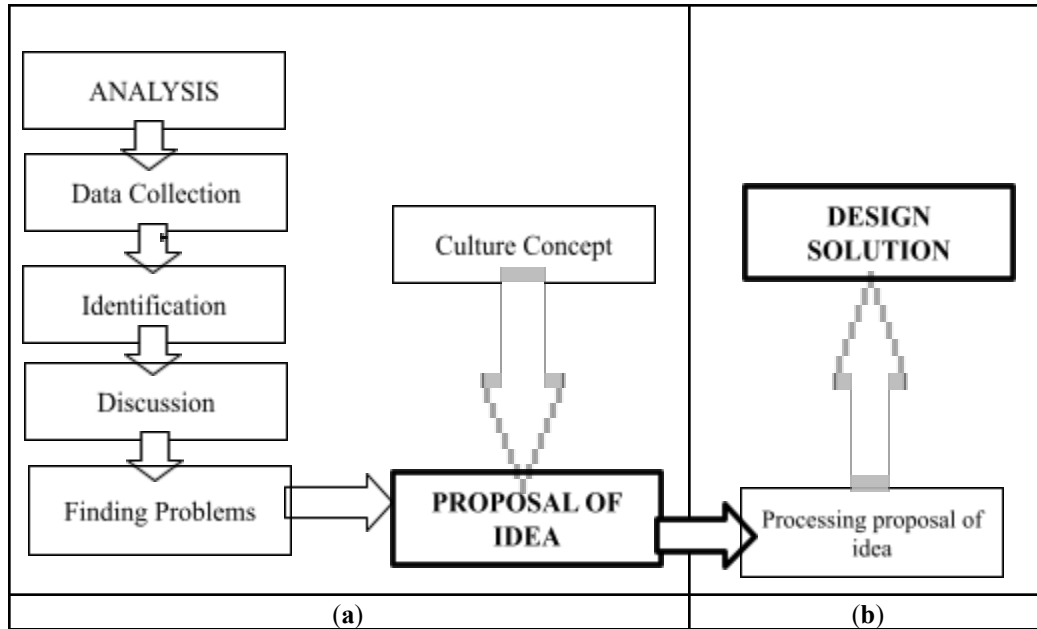


Figure 2. Design Solution Process.
 (Source: Author's collection)

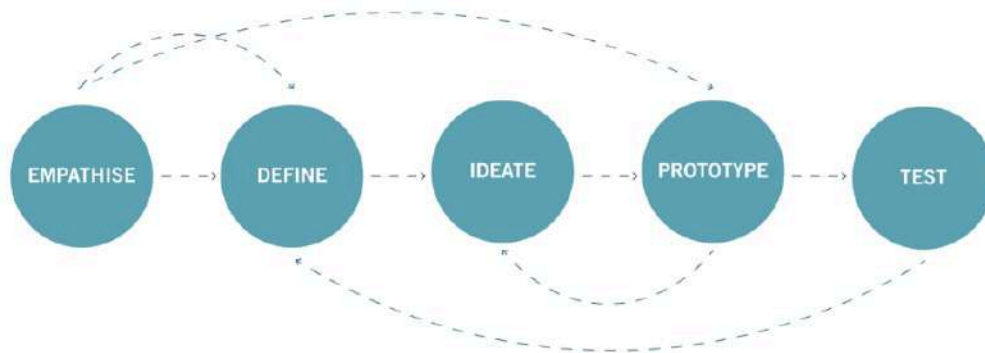


Figure 3. Design Thinking Process.
 (Source: <https://careerfoundry.com/en/blog/ux-design/design-thinking-process/>)

The workflow of the design method comprised two main stages: (a) The first included data analysis, where social problems were identified through data collection. The data were subsequently scrutinized, and the problems were formulated in the idea proposal. (b) The second stage was dedicated to processing the idea proposal into a comprehensive design solution. This stage followed a creative strategy process, providing an innovative solution to accommodate organizational structure development necessitating a shift toward a more human-focused design. The specific flow of thinking comprised the following steps:

1. Emphasize: Understanding client needs by immersing oneself in the perspective and emotions of the client.
2. Define: Sorting and analyzing the information obtained to derive a systematic problem statement.
3. Ideate: Generating innovative solution ideas through out-of-the-box brainstorming. It is essential not to limit ideas during this stage to maximize innovation.
4. Prototype: Creating a physical form in an experimental module, allowing for direct observation, testing, and analysis.
5. Test: Conducting an assessment to ensure errors are avoided during field implementation.

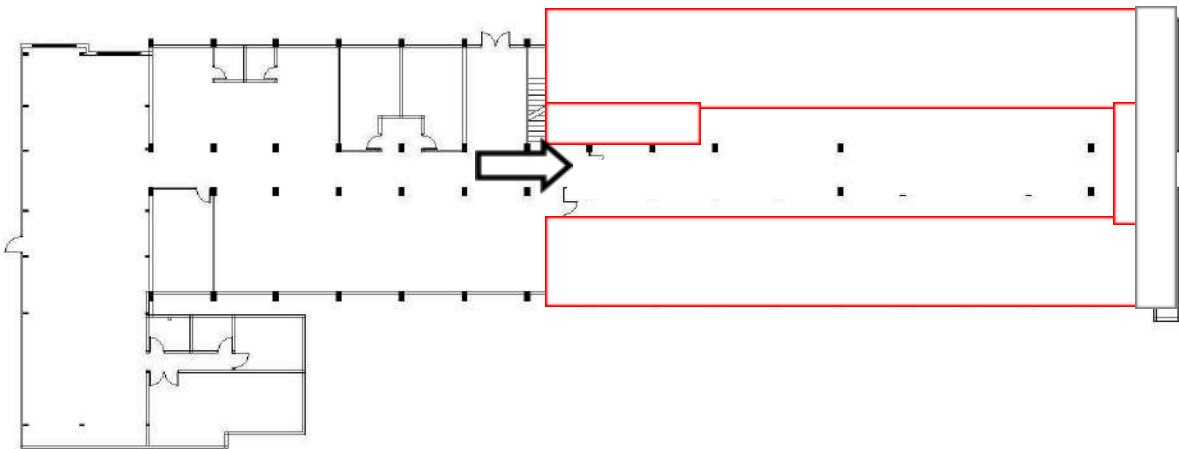


Figure 4. Grouping.
(Source: Author's collection)

Office grouping is visually represented by dividing the space into two distinct areas. The main area is shown with red shading, while the supporting area is depicted in gray shading. The unshaded white area denotes the circulation path, and an arrow shows the entrance.



Figure 5. Exposure Images
(Source: Author's collection)

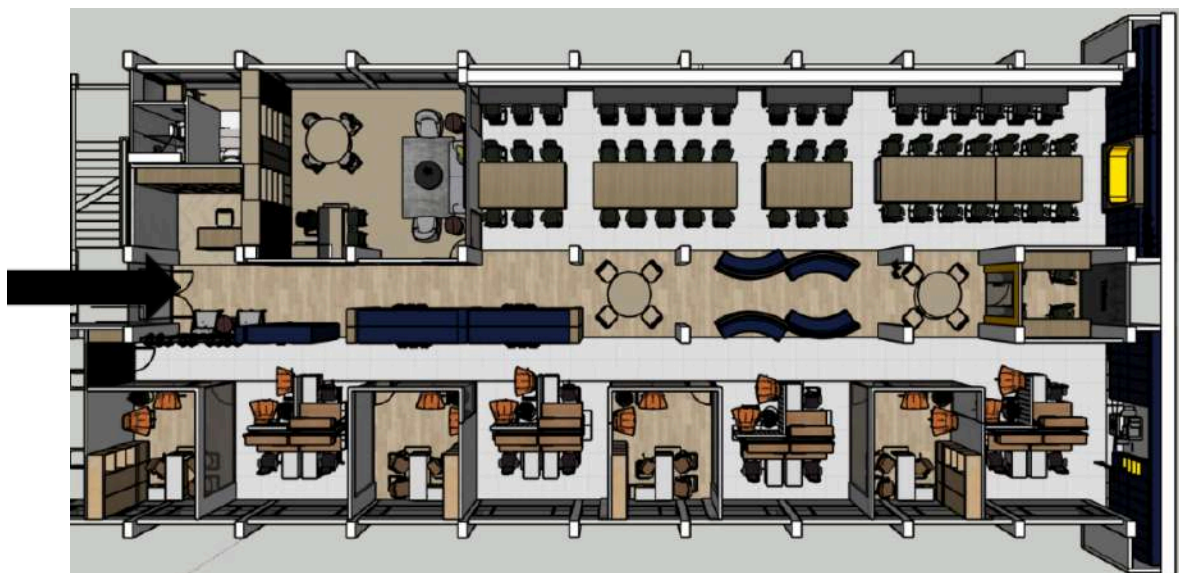


Figure 6. Lay Out Furniture. The arrow shows the entrance.
(Source: Author's collection)

The karo staff is strategically situated near the entrance and serves as a guest filter. The proximity to the bureau head room aids its function in assisting leadership. To ensure privacy, the head room is also positioned close to the entrance, preventing visitors from entering the private work areas. Furthermore, the leadership and staff areas are located differently to distinguish their functions. A lounge space is also designated for casual discussions between leaders and staff, as well as a relaxation area. Non-civil servants are physically separated from the structural areas due to their differing functions.

The combination of gypsum and glass in the enclosed spaces of the Bureau Head and Section Head ensures that space constraints are distinct. This configuration not only allows for two-way supervision and interaction but also fosters the open space design that promotes collaborative work, enhancing creativity and productivity. Moreover, staff desks are designed with a co-working system, facilitating interaction and teamwork. For strata 3 leaders, a desk system resembling the staff desk model is adopted, featuring different design models with a 160 cm high partition for added privacy. The discussion area between the leader and staff is replaced with a sofa positioned in front of the leader desk. The figure below provides a detailed description.



Figure 7. Perspective of bureau head room. The arrow shows the glass partition.
(Source: Author's collection)



Figure 8. Perspective of the open space working area.
(Source: Author's collection)

Furniture Concept

Compact furniture is essential for the open space office, as it offers practicality and lightweight features, while meeting space requirements. However, it is crucial to note that support facilities for work

should not be reduced. In the case of strata 3 work area, serving as the workspace for sub-section heads, the original configuration allocated 8.5 sqm for each person, including a work desk and chair, facing chair, and storage credenza with a 160 cm high partition. The new furniture concept maintains the same facilities but replaces the facing chair with a sofa set for collaborative use. Furthermore, the work area is increased to 10.5 sqm to accommodate three individuals. This provides enhanced efficiency by saving 30 sqm of space and promoting direct interaction between sub-division heads.

The original staff work desk features a dividing partition with a height of 120 cm, preventing cooperation. The new furniture concept adopts a co-working style, uses a desk without partition, and provides space for laptops and books. In addition, the requirement of only 1.5 sqm for the new model compared to 2 sqm for the old model results in a space savings of 27 sqm.

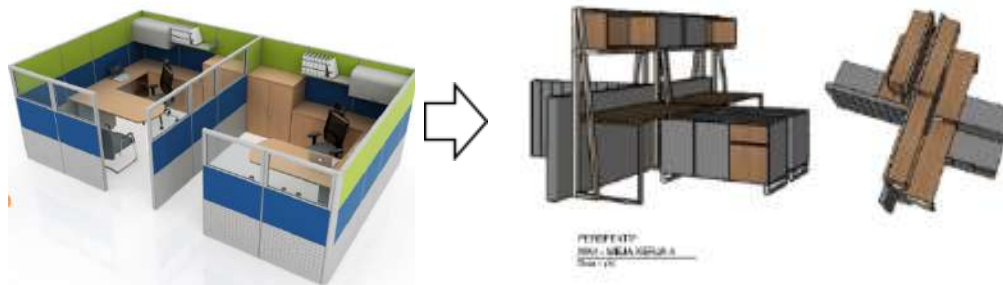


Figure 9. Strata 3 furniture model. Left is the closed model, and the right is the open space model
(Source: <https://indovickers.com/product/workx-2/> and Author's collection)



Figure 10. Model of staff furniture. The left is a model with a cover panel, and the right is the open space model in a co-working style.
(Source: Author's collection)

CONCLUSION

In conclusion, the transition from closed-system offices to the open space design was a strategic response to the evolving needs of modern organizational structures. While closed offices offered privacy at the cost of requiring substantial space, the open space design, with its adaptable furniture models, provided an ideal solution. Social dynamics and meanings in the open space could be managed through thoughtful facility combinations like glass and gypsum. This transition was advantageous, as it promoted enhanced performance, teamwork, two-way supervision, and the efficient use of space. To address space-related challenges, the integration of the design method and thinking theory served as a valuable reference in the development of contemporary office spaces.

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Operational Management Practices in Kuala Lumpur Private Galleries

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ABSTRACT

Management stands as one of the most crucial professions in the annals of human history. People established organisations to attain objectives that were unattainable through individual efforts alone. To ensure the harmonisation of individual actions, management has emerged as a fundamental necessity. Within this context, operational management constitutes a component of a system responsible for organising and overseeing various production processes, as well as adapting corporate procedures to generate goods or services. The origins of operational management can be traced back to the early 20th century when Frederick W. Taylor introduced the principles of scientific management. Taylor's pioneering work laid the groundwork for contemporary operational management practices. This article delves into the strategies of operational management employed by private art galleries in Malaysia, with a particular focus on their role in safeguarding and promoting visual artefacts. The main aim is to analyse the operational management practices used within two galleries in Kuala Lumpur to preserve the necessary level of quality and artistic freedom with one objective which is to identify the facilities and infrastructure of a private gallery exhibit. The findings of this study suggest that it could serve as a definitive guide for galleries, furnishing institutions with a manual or set of instructions that will benefit not only the visitors but also the artworks on display. The aspiration is that this research could make a meaningful contribution to the enhancement of operational management practices in private galleries located in Kuala Lumpur.

Keywords: *Operational, Galleries, Facilities, Infrastructure, Organization.*

INTRODUCTION

Art galleries' primary mission revolves around nurturing visual artworks, promoting artists' creations, and presenting them to the public, collectors, media, and cultural institutions. While various departments play essential roles within these galleries, operational management stands out as a vital and indispensable component. Operational management, in its broader context, aims to deliver a service that upholds the desired quality standards for the gallery space. It plays a crucial role in preserving artworks while

allowing them the freedom to express the artist's original intent. In this research, the researchers will closely examine the mechanics and components of operational management within two art galleries in Kuala Lumpur. This article focuses on the foundational aspects of the research, including the problem statement, where the researchers will define the issues related to the topic and emphasise the significance of their study. Within the problem statement, the researchers will articulate the necessary infrastructure for effective operational management and underscore the critical elements that every operation should encompass.

The research objective is addressed, providing clarity on why this research was undertaken and outlining the goals which the researchers aim to achieve, particularly in the context of operational management. Furthermore, this article delves into overseeing a gallery's architectural structure to apply in operational management activities. On the other hand, the study aims to identify the facilities and infrastructure required for private gallery exhibitions, ensuring audience satisfaction and the preservation of artworks' value during installation. It is worth noting that operational management finds applications in various industries beyond art galleries. Therefore, this study can serve as a valuable resource for anyone seeking to understand operational management principles and potentially become a reference for future operational management professionals.

Operational management of any gallery involves the installation of an artwork in the exhibition space. This involves arranging, transporting and placing each artwork which needs to be correlated with the condition of the works. This also relates to the humidity, lighting, security and even the angles of placements for the artworks. Operational management is a crucial department when it comes to managing an exhibition. The infrastructure of the gallery must be up to date and obtain standard equipment and procedure for an established gallery. Most galleries are not equipped with suitable facilities to exhibit artefacts and artworks (Ahmad Razlan, personal communication, February 9, 2023). This is a concerning issue towards the security and development of galleries in our country as the galleries must be able to commit to and establish a structured system to preserve and display an artefact to promote and showcase artwork. There is an intricacy of the whole experience in operational management, where each key activity holds a major importance to the visitors as well as to the artworks. It is also worth mentioning that it can take 8 to 12 months of operation to install an exhibit.

According to Fiqri (n.d.), people do not realise how time-consuming operational management is and how it relates to the condition of the artworks and to satisfy the public viewing. From this statement, we can see the public is not aware that operational management must oversee the conditions of the artefacts to be able to fit in the gallery space before it is opened for viewing. Planning an exhibition is very difficult, as it takes up hours and requires manpower to fully operate the entire process. For the research objectives, this research aims to study and analyse the operational management practices used within these galleries to preserve necessary levels of quality and artistic freedom. The objective is to recognise the necessary facilities and infrastructure for private gallery exhibitions while also recommending the essential facilitation that these galleries should acquire. In this journal, the researchers will elaborate on the influence of how an operational manager affects not only the artwork but also the visitors that come to view the exhibition. This study is to meet one objective, which is to identify the facilities and infrastructure of a private's gallery exhibit.

This paper highlights the significance of operational management, a critical practice not confined to art galleries but prevalent in various industries. This research, however, is not limited in its potential audience. It extends its benefits to those interested in gaining insights into operational management, particularly appealing to cultural practitioners, art enthusiasts, and individuals passionate about art preservation. Operational management serves as a foundational system in art galleries, safeguarding valuable artworks. Consequently, this study equips them with essential information and knowledge, shedding light on the structured approach within the art gallery system. Educators and institutions also stand to gain from this research. It can enrich academic resources by inspiring the creation of new books and the addition of related topics in university lectures. This, in turn, provides valuable insights for future curators, scholars, art writers, art preservers, and art educators. Moreover, the study benefits the general

public by providing a comprehensive understanding of operational management. This offers a valuable perspective to the younger generation, allowing them to appreciate the intricacies of managing art exhibitions. Ultimately, this research extends its advantages to cultural practitioners, art enthusiasts, educators, gallery curators, academic institutions, and the broader public.

LITERATURE REVIEW

Incorporating relevant theories into this research requires a comprehensive understanding and a thorough review of current knowledge and existing research. This review serves as a valuable source for the study. To achieve this, the researchers have outlined several sub-topics directly related to the research's title and objectives. Through this structured approach, the researchers will analyse and collect information with the goal of identifying gaps in current knowledge, highlighting the limitations of existing theories and perspectives, pinpointing subjects for future research, and exploring areas of disagreement. Essentially, the progression of any field is driven by the logical synthesis of prior research, building upon the findings of earlier studies (Kumar et al., 2019). It's important to underscore the significant impact of literature reviews on the development of concepts, methodologies, and thematic understandings across various subjects. They serve as a fundamental tool in the research process (Palmatier, Houston, & Hulland, 2018; Hulland & Houston, 2020).

A well-structured literature review empowers the researchers to establish fresh theoretical frameworks and engage in critical dialogues on specific research issues. This is achieved by weaving together existing literature, synthesising previous studies, and identifying knowledge gaps within a defined timeframe. In summary, the primary objective of a literature review is to conduct a critical examination of the existing body of literature within a given research area, theme, or discipline. This process involves identifying relevant theories, key constructs, empirical methods, contextual factors, and any outstanding gaps in research. Ultimately, it lays the groundwork for establishing a future research agenda built upon addressing these identified gaps.

The Definition to Management

Management is a fundamental and vital aspect of human existence. People have formed associations to collectively achieve objectives that are often unattainable as individuals. The practice of management is now indispensable to ensure that individual efforts are harmonised. Management is relevant across various types of organisations and applies to managers at all organisational levels. These management principles are not confined to businesses alone; they extend to government, military, social, and educational institutions. While the essence of management remains consistent across different organisations, its complexity can vary significantly depending on an organisation's size and scope. Management, in essence, serves as the lifeblood of any organisation (Herrity, 2023).

In today's industrial world, effective management is irreplaceable, playing a pivotal role in enhancing human productivity and delivering superior technology, products, and services to society. Management is closely tied to the efficient utilisation of production resources, including people, equipment, materials, and financial assets. It is a critical function that permeates all facets of an organisation's operation (Csshbb, 2016). Management is the driving force behind the transformation of disparate resources into a functional and efficient enterprise. At its core, management involves orchestrating the efforts of individuals to work collaboratively toward common goals.

Management is often described as the art of enhancing efficiency through a social process. It involves achieving objectives by working through others and entails a well-defined plan of action guided by a cooperative group striving for a shared purpose. Effective management means making optimal use of available resources to reach a common goal. It encompasses a broad spectrum of activities, including

planning, organisation, forecasting, coordination, leadership, control, and motivation, all aimed at achieving specific objectives. In essence, management is the body responsible for establishing and enforcing rules and procedures. This is done when calming down and shooting.

Operational Management in Galleries

Operations management is a critical component of the broader field of management. It encompasses the planning and control of manufacturing processes and the restructuring of corporate procedures to produce goods or services. Its primary responsibility is to ensure the efficiency of an organisation's operations in fulfilling client needs while minimising resource usage. Operations management plays a central role in overseeing the entire production or service process, which involves the transformation of inputs into outputs (Maiti, 2021). While operational management in galleries holds a similar outcome as the discipline is integral to providing services, creating products, handling representation, offering support, managing distribution, and ensuring quality. As operational management is actually applicable across various industries and organisations, including galleries, banks, hospitals, and businesses that engage with suppliers, collectors, dealers, customers, and technology.

Galleries

Within the realm of museums and galleries, some of the most remarkable architectural feats can be observed. Arup has collaborated with renowned architects for over half a century to bring to life captivating and highly esteemed structures. Our involvement goes beyond creating brand-new and enthralling exhibition spaces; we also undertake the revitalization of museums and galleries nestled within historic edifices. The design process often encounters divergent priorities among stakeholders when it comes to crafting versatile, multipurpose rooms for preserving and showcasing exhibits. Curators prioritise accessibility, education, and the preservation and display of artwork. Operators seek spaces that are secure, efficient, and adaptable. Directors are frequently concerned about the regional and global context, while philanthropists weigh the reputation of the organisations they support. Visitors naturally desire aesthetically pleasing and functional settings, while artists require venues that are flexible and inspiring.

The term "art gallery" is often used interchangeably with "museum," as exemplified by the Walters Art Gallery, a museum in Baltimore, Maryland. An art gallery can refer to a building, hall, or space dedicated to the public exhibition of artworks. However, in a narrower sense, it may also denote a private business establishment that sells works of art. Special exhibitions are often organised for this purpose (Art Museum, n.d.). Many artists maintain formal agreements with galleries that allow them to display their work and receive a share of the sales as their representatives or dealers.

In ancient Greece, the public trust preserved and made accessible a rich collection of Greek artefacts for both the general populace and scholars to observe and appreciate. Temples held votive offerings, statues, and paintings, which, when exhibited collectively, were referred to as "pinakotheke" (Haja, 2014). The Propylaea, a hall within a structure on the Acropolis in Athens, once housed a collection of paintings dating back to the 5th century B.C.E., which were open to the general public

Types of Galleries

An art gallery is essentially a space where art is exhibited and offered for sale. These galleries function as for-profit enterprises and play a pivotal role in managing the portfolios of artists. They serve as intermediaries, representing, promoting, and distributing the works created by various artists. However, it's important to recognize that not all art galleries are identical. While many art galleries share common operational styles and structures, there exists a diverse array of art galleries that employ distinct

approaches (Delagrange & Delagrange, 2023). Each type of art gallery warrants its unique description, offering a broad overview of what defines an art gallery and how it chooses to present itself

Table 1. Types of Galleries

No	Types of Galleries	Functions
i.	Commercial Art Gallery	Most common style of an art gallery, this gallery collaborates with many artists and agrees to promote and represent them.
ii.	Mega Art Gallery	Is considered a growing commercial gallery in becoming a dominant force in the gallery industry as well as the art scene.
iii.	Vanity Art Gallery	A gallery that charges artists who want to hold an exhibition or showcase and sell their works in exhibits. Prices may vary accordingly.
iv.	Exhibition Art Gallery	It is not a gallery but an area for display. To set up an exhibition and display their works, artists should rent an exhibition space.
v.	Artist-Run Gallery	Self-made art spaces where a gallery operated by an artist may be equally successful and well-known as a commercial space.

Private Galleries in Kuala Lumpur

Kuala Lumpur boasts a variety of established galleries, each serving a distinct purpose and readily accessible within the capital city of Malaysia. The following table presents a list of private galleries in Kuala Lumpur:

Table 2. List of Private Galleries in Kuala Lumpur

No	Private Galleries in Kuala Lumpur	Types of Gallery
i.	Ilham Gallery	Commercial Art Gallery
ii.	Wei-Ling Gallery	Commercial Art Gallery
iii.	Richard Koh Fine Art SDN BHD	Commercial Art Gallery
iv.	Petronas Gallery	Commercial Art Gallery
v.	TAKSU Kuala Lumpur	Vanity Art Gallery
vi.	HOM Art Trans	Vanity Art Gallery
vii.	Vallette Gallery	Commercial Art Gallery
viii.	Chandan Gallery	Commercial Art Gallery
ix.	A+ Works of Art	Commercial Art Gallery
x.	Pelita Hati Sdn. Bhd.	Vanity Art Gallery
xi.	Kitch-N-Art Gallery	Commercial Art Gallery

xii.	MAPKL, Publika	Exhibition Space
xiii.	OUR ArtProjects	Vanity Art Gallery
xiv.	Shalini Ganegra Fine Art	Commercial Art Gallery
xv.	The Back Room	Exhibition Space
xvi.	Ruang Pemula	Mega Art Gallery
xvii.	RA Fine Arts Sdn Bhd	Commercial Art Gallery
xviii.	Artemis Gallery	Commercial Art Gallery
xix.	ZHAN Art	Commercial Art Gallery
xx.	KL City Art Gallery	Commercial Art Gallery
xxi.	Lostgens'	Artist-Run Gallery
xxii.	Gallery Tangsi	Exhibition Space
xxiii.	AP Art Gallery	Commercial Art Gallery
xxiv.	Pipal Fine Art	Commercial Art Gallery

RESEARCH METHODOLOGY

In the quest for the most suitable research method, the researchers embarked by defining the research's title, identifying the problem statement, and establishing the research objectives. This step served as a crucial foundation for determining the optimal method to employ. Subsequently, the researchers pursued a two-pronged approach, harnessing both primary and secondary data methods. Primary data collection was central to addressing the research objective, which aimed to identify the facilities and infrastructure of a private's gallery exhibit. This approach allowed the researchers to gain deeper insights into the subject matter by exploring opinions, behaviours, experiences, phenomena, perspectives, and ideas. To illustrate, the researchers conducted observation, meticulously analysing the recorded data to assess its relevance and extract valuable insights for the research. Subsequently, the researchers transcribed the findings, providing a comprehensive account of the collected data. This method also facilitated the generation of recommendations and solutions derived from the initial problem statement, thereby contributing to the enhancement of operational management practices.

Primary and Secondary Data



Primary data collection is one of the vital methods that empowers the researchers to gather information directly from the primary source, firsthand. This type of data holds significant importance due to its originality and the authenticity it offers. In the context of this research, the researchers will employ a specific form of primary data collection known as observation. Observation entails the collection of data through visual means, where researchers rely on their vision to watch and interpret the behaviour and circumstances of the subject without any direct intervention (Ho & Limpaecher, 2022). It is worth noting that observation involves analysing and documenting the situation without posing questions to the subjects. Observation emerges as the most suitable method for this research because it allows the






researcher to delve into the intricacies of operational management within private galleries. Through observation, the research will gather genuine information solely by visually examining the facilities and infrastructure of a private gallery. The researchers will embark on journeys to various private galleries in Kuala Lumpur, where they will meticulously observe the operational management processes within the industry. While secondary data is a data collection method that will be used by the researchers are books, journals and online websites. It differs from primary data as this data is already available on different platforms and is accessible to anybody including to the researchers. This helps the researchers conduct the article in time instead of searching for data which can be time-consuming.





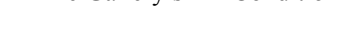
FINDINGS




The successful execution of this research was accomplished through the method of observation, which proved instrumental in achieving the research objectives. The researchers diligently observed and recorded these observations, unveiling the various facilities and infrastructure features within the galleries. Among the galleries visited and observed by the researcher are Wei Ling Gallery and Petronas Gallery in Kuala Lumpur and. Through these observations, the researchers discerned the disparities between the assets of the galleries and the fundamental operational systems in place within private galleries. These operational aspects encompassed the gallery's physical attributes, including the walls, flooring, ceiling, air conditioning, hanging systems, lighting, and security measures.

Table 3. Observation of Facilities and Infrastructure of Each Gallery.

WEI LING GALLERY		
No	Facilities and Infrastructure	Elaboration
i.	<p>The Gallery's Walls</p> 	<ul style="list-style-type: none"> - Walls are big and spacious, suitable for big and tall canvas that might fit the wall. Due to the galleries open structure of three levels building - Certain walls are only suitable for moderate size artworks.
ii.	<p>The Gallery's Flooring</p> 	<ul style="list-style-type: none"> - Gallery Flooring is made from wood, following the gallery's past history of preserving wood from the building. In which the building was burnt down and rebuilt by the director's Father. - Flooring can be quite shaky due to the type of material used.

iii.	<p style="text-align: center;">The Gallery's Ceiling</p> 	<ul style="list-style-type: none"> - Gallery ceiling gives off the inspiration of using wood. Shows a unique perspective of a much more conceptual private gallery. - Shows that the gallery has hands in building the gallery from scratch.
iv.	<p style="text-align: center;">The Gallery's Lighting</p> 	<ul style="list-style-type: none"> - The Gallery lighting is up to date using both types of focus and a wide type of lighting for different artworks. - Lighting can be seen very bright, bringing out all the detail in one artwork.
v.	<p style="text-align: center;">The Gallery's Air Condition</p> 	<ul style="list-style-type: none"> - The air-conditioning in the gallery is also up-to-date, controlling the overall humidity of the gallery and keeping the artworks in good condition. - It also keeps the visitors comfortable and cool.
vi.	<p style="text-align: center;">The Gallery's Security</p> 	<ul style="list-style-type: none"> - The gallery uses a door with a key access for the security control at the entrance. Visitors must ring the bell to enter the gallery. - Good security system is vital for self-made private galleries.
vii.	<p style="text-align: center;">The Gallery's Hanging System</p> 	<ul style="list-style-type: none"> - The hanging system for this gallery is common. - Very precise and proper. - Composition looks clean and close to the wall.

PETRONAS GALLERY		
	Facilities and Infrastructure	Elaboration
i.	The Gallery's Walls 	<ul style="list-style-type: none"> - The walls surrounding the gallery can be used to hang up artworks and descriptions of the show and exhibition. - Some walls seem to be artificial that can be moved, but still look secure and sturdy.
ii.	The Gallery's Flooring 	<ul style="list-style-type: none"> - The gallery flooring looks strong and has a marble finish that reflects the lighting during an exhibition. - The color of the flooring helps make any artwork fit with the environment of the gallery.
iii.	The Gallery's Ceiling 	<ul style="list-style-type: none"> - The ceiling of the gallery gives off a futuristic feeling. - With a silver metal interior representing Petronas at its finest. The ceiling also does not bother the aesthetic of the artworks during an exhibition.
iv.	The Gallery's Lighting 	<ul style="list-style-type: none"> - The lighting system can be seen all around the gallery. This shows that the gallery is complete and has proper facilities when it comes to lighting. - The ambience of the lighting is also very calm and cool.
v.	The Gallery's Air Condition 	<ul style="list-style-type: none"> - The ceiling has folded interiors in which the air conditioning and the humidity level are

		<p>controlled.</p> <ul style="list-style-type: none"> - An up-to-date infrastructure that not most galleries have and can obtain.
vi	<p>The Gallery's Security</p> 	<ul style="list-style-type: none"> - The Petronas Gallery is one of the secured private galleries that we have in Kuala Lumpur. - Facilitated with big walls and secured doors. - Equipped with security guards patrolling the gallery during exhibitions.
vii.	<p>The Gallery's Hanging System</p> 	<ul style="list-style-type: none"> - The hanging system, as expected, looks clean and proper. - The hanging system for each artwork has an eye-level effect, giving a professional finish and a beautiful outcome.

Overall Observation

The overall verdict of the observations that have been conducted and the data that have been collected by the researchers will be stated in this section. The observations are a method to meet the objectives of the research which is to identify the facilities and infrastructure of private gallery needs. Each gallery that has been visited by the researchers will be acknowledged by the different types of building and structure that the gallery is facilitated. The researchers have identified that most galleries have different approaches especially to the type of artworks that are displayed in their facilities and the theme of the gallery. The researchers will list down all of the proper facilities and infrastructure of what a proper gallery needs in order to function and operate well. The list that has been stated by the researchers is the most idealistic and suitable structure and potential scenery that can be used for a gallery in general.

Table 4. Proper Facilities and Infrastructure of a Gallery.

No	Facilities and Infrastructure	Elaboration
i.	The Gallery's Walls	The walls of the gallery should be enough for an art piece and should be spacious enough to hold and portray artworks that are bigger than the average size. Therefore, the gallery must be prepared to have walls that are big enough for extreme artists that have big artworks. The walls must also be painted in a neutral

		colour or most commonly white to make sure that the artworks will pop out during an exhibition.
ii.	The Gallery's Flooring	The floors of a gallery must be spacious and clean with a neutral toned colour. This is because the flooring is an important part of the environment of a gallery. The floors can reflect on the aura of the exhibition, especially the colour palette of the exhibition. Making the colour of the type of surface of the floors can also determine the theme of the exhibition or the gallery overall.
iii.	The Gallery's Ceiling	The ceiling of the gallery must be built and structured in a proper establishment as the ceiling plays an important part in all the other necessary facilitation such as the lighting or the air conditioning. The ceiling must be rock solid and hold a good foundation to be able to run and operate for a long amount of time. Other than that, the colour of the ceiling as well should be neutral colour or most commonly the colour white.
iv.	The Gallery's Lighting	The gallery's lighting is different according to the structure of the building or the type of artworks that are presented. But most importantly the lighting system must be up to date to avoid any inconvenience or issue that might affect the artwork's value or the visual representation. In addition, the lighting must also fit the theme of the showcase, should it be bright or gloomy; which depends on the lighting of the gallery.
v.	The Gallery's Air Condition	The gallery's air condition must also be up to date as it relates to the conservation aspect of the artwork. If the temperature of the gallery is not suitable the condition of the artworks might deteriorate or become damaged. Other than that, the air condition must also be able to fill the whole gallery to make sure that the visitors and even the staffs are comfortable when visiting
vi	The Gallery's Security	The gallery's security should also be up to date and must be well managed. This goes for both technology security and physical security. To make sure that these valuable collections are safe and are not open to the public without having to go through proper security inside and outside the gallery.
vii.	The Gallery's Hanging System	The hanging system should also be up to date as the artworks must follow the proper way of being showcased as some artworks nowadays have a unique way of being represented therefore galleries must be equip with proper tools and facilities in order to figure out how to hang these artworks in the same time secure the form of the artwork as well as the safety of the visitors.

CONCLUSION

In summary, this research has diligently collected all the necessary data required to fulfil its objectives. It commenced with an introduction that outlined the nature of the research and underscored its primary objectives. The study initiated an exploration of operational management within art galleries, shedding light on the challenges inherent in the exhibition process. The core research objective aimed to identify the facilities and infrastructure of a private's gallery exhibit. The paper also delved into a comprehensive literature review, elucidating the concept of operational management and its significance in corporate

contexts, with specific emphasis on its unique applications within art galleries. It explored the proper buildings of an industrial gallery and the facilitation that needs to be applied in galleries prevalent in Kuala Lumpur.

The methods and tools employed for data collection were described, highlighting the use of primary data collection through interviews. The research findings revealed insights into the facilities and infrastructure essential for galleries, aligning with the research's objectives. The primary data collection methods encompassed observations of four private galleries in Kuala Lumpur. The research culminated in a set of practical recommendations and a comprehensive conclusion. These recommendations provided solutions to the identified issues within the research scope, offering valuable insights and workable suggestions. They took into account any limitations or constraints encountered throughout the research process. In conclusion, this research successfully achieved its objectives, providing valuable insights into the facilities and infrastructure required for galleries and the key activities in operational management. The research employed appropriate methods and tools to ensure the galleries' suitability and security for both artworks and visitors. This study was conducted meticulously and accomplished its objectives effectively.

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Analysing The *Sakuga* Technique in The Animation of *Mob Psycho 100* (2016)

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ABSTRACT

What aspects of an action scenario make it effective? That question has been on the minds of filmmakers, animators, audiences, and fans for a while, and there are as many responses as possible to it. However, there might be a few general characteristics that, when applied in one way or another, give a scene its personality and, perhaps, make it enjoyable for the viewer thanks to the *Sakuga* technique. In this paper, the researcher will discuss the topic of *Sakuga*, one of the branches of the animation method by analysing the *Sakuga* technique in the animation *Mob Psycho 100* released in 2016. The researcher will also cover the background research on the term *Sakuga* used in this study. *Sakuga* is a type of animation that is mostly used in the Japanese anime series *Mob Psycho 100*. The researcher will discuss the relevant use of this animation technique and how it influences or has an impact on other animation subcultures when using this method, in addition to the study problem statement and the research objective, both of which are presented in this paper. A topic that is relevant to the research investigations and its constraints will be decided together with the objective and its challenges. The study's importance, scope, and limits will all be addressed along with the Animetism Theory from the book *The Anime Machine* as the theoretical framework.

Keywords: *Storytelling, 2D Animation, Animetism, Sakuga Technique*

INTRODUCTION

Studio Bones was established in October 1998 by Masahiko Minami, Hiroshi Saka, and Toshihiro Kawamoto, who were employees of Sunrise at the time. The animated series *Mob Psycho 100* (2016) was made by the studio and was broadcasted in the year 2016. The narrative centres around the protagonist, Shigeo Kageyama, commonly referred to as Mob, a juvenile individual endowed with exceptional psychic powers, as he endeavours to achieve the state of contentment he desires. The inaugural season was broadcast throughout July and September in the year 2016. The television series *Mob Psycho 100* (2016) employs the artistic technique known as *Sakuga* as a distinct medium for conveying its dramatic elements

and narrative. This utilisation of Sakuga exemplifies its versatility as a means of artistic expression across various forms of media. Hence, the objective of this study is to ascertain the significance of *sakuga* animation techniques and to analyse the specific use of the *sakuga* technique within a particular episode of *Mob Psycho 100* (2016) as a means of acknowledging the diligent efforts invested in the production of the series. *Sakuga* refers to a distinct sequence within Japanese animation (*anime*) that exhibits notably superior quality and is employed to highlight a moment of great significance. In his research titled "Exploring *Sakuga*: Part 1: *The Birth of Otaku, the Birth of Sakuga*" by Matteowatz (May 8, 2021), it has been asserted that inquiring about the definition or significance of *Sakuga* from various individuals will yield a diverse range of responses. However, most of these comments are expected to revolve around the subsequent concepts: *Sakuga* refers to a form of animation characterised by its exceptional quality and often produced by highly skilled animators. Animation encompasses a broader scope beyond the mere visual representation of objects and movements displayed on a screen. In alternative terms, animation refers to the process of imparting movement to an object or entity through the creative efforts of an individual. While the term "anime" is commonly used to encompass several forms of visual media, including animation, it is distinct from other Japanese terms that also relate to animation. According to Tonari Animation (2022) in The Anime Survival Kit, the term *Genga* in Japanese denotes "key animation." It pertains to a technique that involves utilising data derived from E-conte to generate diagrams, instructions, and annotations that delineate the utilisation of layers, character postures, acting, animation, backdrop components, and effects to establish the framework for the *Douga* (stage). Ultimately, this method serves to create the final artwork and animation instructions. It might also be used to describe the final version of an animated scene. Therefore, the term implies that it is only a minor component of a larger production process and that it is conceivable to ambiguously attribute its production to several distinct agents while providing credit to the primary movers. The primary objective of this research study is to analyse contemporary animated series that prominently exemplify the concept of "*Sakuga*," with a specific focus on the animated television series *Mob Psycho 100* (2016) produced by the renowned studio Bones.

The technique known as *Sakuga* can be employed to accentuate specific scenes within an episode. According to kVIN (2016), describing the battles as merely cool would be an understatement. While they may not be the central emphasis of the series, they undeniably serve as noteworthy highlights. The gap for this research is to study and identify which technique has been used in each episode of *Mob Psycho 100* (2016). The research will involve the systematic observation and analysis of each episode of the television series *Mob Psycho 100* (2016). The series features a variety of unique *Sakuga* techniques that need to be studied so that they can be applied to the researcher's final-year project animation. The acquisition of a technique must align with the genre that was attended and serve as the focal point of the animation cut. Consequently, the researcher is compelled to elucidate the importance of studying the Japanese animation technique referred to as *Sakuga* within this discourse, as well as endeavour to cultivate an appropriate *Sakuga* technique to implement in the researcher's forthcoming final-year animation endeavour. The researcher has outlined several objectives to fulfil the criteria of this paper. The primary objectives include the identification of *Sakuga* techniques employed in the animation series *Mob Psycho 100* (2016), the analysis of various *Sakuga* techniques utilised in a specific episode of *Mob Psycho 100* (2016), and the development of effective *Sakuga* techniques for implementation in the researcher's animation projects. The meaning of research aim pertains to the delineation of the goals of a research attempt through the formulation of specific research objectives. Each stage of the research process, including data collecting, argument construction, and conclusion development, should be guided by established principles (Ryan, 2022). Several research questions have been set by the researcher in carrying out the process of studying the *Sakuga* technique to demonstrate it in animation. The research question pertains to the utilisation of *Sakuga*, a term in animation, inside the *Mob Psycho 100* (2016) series. This question intends to ascertain the semantic significance of the term *Sakuga* as it pertains to the animated series *Mob Psycho 100* (2016). Another question is to distinguish the *Sakuga* technique used in the animation of *Mob Psycho 100* (2016). Lastly, what *Sakuga* technique can be developed for implementation in the researcher's animation project based on *Mob Psycho 100* (2016). Furthermore, this study could potentially provide a significant contribution to the community, as well as to animators and students engaged in the study of animation, by offering insights into the effects of *Sakuga* as observed by professionals within the animation business.

Moreover, the present study aims to function as a valuable reference for those within the community who possess an interest in comprehending the concept of *Sakuga*, as well as determining the appropriate animation style or *Sakuga* technique that ought to be employed to generate captivating animation sequences for the researcher's animation endeavour. This study focuses only on the outcomes of the *Sakuga* method, which is a concept that appears in the anime *Mob Psycho 100* (2016). The series captivates and motivates both viewers and aspiring animators through its numerous unforgettable sequences and events. Consequently, the limits of the study indicate the possible presence of substantial deficiencies in the research. The utilisation of the *Sakuga* technique from *Mob Psycho 100* (2016) has certain limits for animation producers seeking to acquire comprehensive knowledge and employ intricate and demanding procedures that may prove tough for inexperienced animators in their creative endeavours.

LITERATURE REVIEW

The researcher will provide an overview and conduct a comprehensive analysis of the *Sakuga* technique employed in the *Mob Psycho 100* (2016) series. This discourse will encompass various sections, specifically focusing on the identification of the *Sakuga* animation technique employed in the anime series *Mob Psycho 100* (2016), the analysis of diverse *Sakuga* techniques utilised in a specific episode of *Mob Psycho 100* (2016), the formulation of efficient *Sakuga* techniques for implementation in animation projects, and further exploration of the Animetism theory as the theoretical framework.

Identifying The *Sakuga* Animation Technique in *Mob Psycho 100* (2016)

Mob Psycho 100 animation is like any other anime production process. The production of an anime is a complex and multifaceted procedure that encompasses multiple stages and steps. However, the primary focus of the researcher's investigation centres on the animation process, namely the application of *Sakuga* techniques. According to Washi (2011), the creator of the Washi Blog, "Key Animation" is considered one of the stages in the production of anime. The key animators commence their task of producing the animation drawings in accordance with the provided storyboard. The quantity of frames produced by a key animator for a given movement is contingent upon the key animator's aims and the characteristics of the cut, while also considering limitations imposed by time and budgetary constraints. As a result, a proficient and committed key animator has the potential to captivate the audience by surpassing the prescribed elements in the storyboard and incorporating their distinctive artistic style into a particular sequence. Certain animators are given the opportunity to deviate from conventional storyboards to create *Sakuga* animations. According to Washi (2011), the term *Sakuga* strictly pertains to the drawings within an anime, however, it is commonly employed to encompass the entirety of the animation.

Sakuga (Japanese for "drawing images") is a term used in anime to describe scenes in a show or movie where the animation quality is greatly improved, either to make a dramatic point or to make the action more interesting. Its pronunciation is "sa-ku-ga." For those who are unfamiliar, the term "*anime*" refers to all Japanese animation. The word "animation" was shortened to create the phrase. Anime exhibits a discernible aesthetic and narrative style, as well as thematic and conceptual elements, owing to its longstanding production within Japan over several decades. In the last four decades, anime has emerged as a widespread cultural phenomenon, garnering a substantial international following and undergoing translation into other linguistic contexts. Cirugeda (2015) is identified as an author affiliated with the website animenewsnetwork.com. The author describes the meaning of *sakuga* in his discourse titled "The Joy of *Sakuga*." The term "anime" is derived from the Japanese language and refers to the art of animation. It has been adopted by enthusiasts beyond the borders of Japan to denote exceptional movement and visual storytelling. Anyone who possesses a sufficient level of familiarity with anime is undoubtedly cognizant of the cost-effective technique frequently utilised by studios, wherein they employ impactful editing techniques during dramatic sequences. The topic of scenes characterised by rapid and

significant gains in animation quality is a recurring theme in discussions. Whether it involves a scene with subtle yet significant character performances or a gratifying sequence showcasing stunning animation.

Based on the researcher's observations, the series *sakuga* or animation technique incorporates various visual elements, including squashes and stretches, which result in a loosely defined depiction of characters. Additionally, this technique involves the intentional distortion of certain limbs to create a striking impact on the characters' focus, particularly evident in combat sequences. A reduced number of frames is used to create a sense of rapidity and disarray within the image. In the video titled "*Breaking Down Mob Psycho 100's Incredible Animation [Episode 1] | Animator Spotlight*" by *The Canipa Effect* (2016), it was observed that the focus of the animation production did not prioritise the incorporation of computationally generated (CG) backgrounds, as no credited CG artists were identified. The keyframes of the cart in the anime series *Mob Psycho 100* (2016) were exclusively illustrated by the same artist responsible for *One Punch Man* and *Space Dandy*. The camera spirals in the tunnel sections were created by Keiichiro Watanabe only via the use of drawings. Additionally, there exists an impact frame sequence depicting a blast attack, accompanied by a visually striking manoeuvre that showcases the emergence of a blinding light onto the screen, effectively transitioning into another scene. *Sakuga* refers to the artistic renderings of animations, and the researcher has observed that the impact and excitement experienced by the audience are dependent upon the specific techniques applied by the animator.

Analysing Different *Sakuga* Techniques That Were Used in A Certain Episode of *Mob Psycho 100* (2016)

To gain a comprehensive understanding of *sakuga*, it is important to educate oneself on the artistic techniques employed in the production of animation and the equipment utilised in its creation. In their publication titled "The Illusion of Life," Disney animators Frank Thomas and Ollie Johnson delineated many techniques, as cited by Matteowatz (2020) in his scholarly essay entitled "*Exploring sakuga: A Sakuga Starter Pack*." Moreover, the primary objective of this discussion is to examine the production process behind the *Sakuga* animation in the series *Mob Psycho 100* (2016). According to an article titled "*Mob Psycho 100: Introduction and Episode 1*" on Sakugabooru.com, it is stated that *Mob Psycho 100* (2016), along with *Flip Flappers* by Kiyotaka Oshiyama, has been widely anticipated by Japanese animation enthusiasts as one of the most highly anticipated TV anime of the year (Liborek, 2016). Before delving into Episode 1, it is crucial to discuss the origins of these elevated expectations, notwithstanding the exceptional quality of the advertising material. Consequently, Yuzuru Tachikawa, the director of the film, and Yoshimichi Kameda, the character designer, exhibit significant potential. According to kVin (2016), the action in *Mob Psycho 100* has recently left a strong impression, however not in the manner one might initially expect. Characterising the fights as merely cool would be an inadequate description; while they may not be the primary emphasis of the series, they undeniably serve as notable highlights.

Based on *The Canipa Effect* (2016), the video highlights a distinctive artistic style, resembling brushwork, used in a particular scene within the series. A camera cut that is characterised by its roughness, unpredictability, sketchiness, and loudness does not implore the viewer to direct their attention towards it; rather, it forcefully confronts the viewer with its artistic and visually overwhelming impact. The phenomenon of a sketchy effect is observable in specific episodes inside the scene known as "Mob Explosion," wherein ink lines are present, encircling the character. The series also incorporates the technique of dynamic glass painting, which centres around spirits and the representation of emotional states through colour. The application of glass paint was also observed during the denouement of the first season of the animated television series *Mob Psycho 100* (2016). To enhance the dramatic depth of the scene, the series regularly utilises a spinning camera technique that has been executed by proficient animation experts. The cinematography in the film is quite impressive, and the transition into the Val creature's unconventional graphics effectively maintains our engagement with the narrative. Rather than causing confusion, these visual transitions serve as a powerful means of portraying the antagonist through animation.

Aside from that, it is worth noting the presence of a distinctive painting style in specific episodes, characterised by the utilisation of the Reigen technique scene. This particular scene showcases the character Reigen employing his unique skill in a manner that elicits hilarious effects. In another example, the animation used a shaky sketch effect to convey the emotional state of the character Mob in Episode 2. Additionally, a painted glass method was employed to introduce a surreal element to the scene. Regarding the subject of painted glass, the underlying concept of the animation entails the utilisation of a glass sheet as a medium for manipulating slow-drying oil paints to generate images and frames inside the animation. The aforementioned genre of animation is widely regarded as one of the most demanding and infrequently seen genres of animation. Nevertheless, upon the completion of her studies at Tokyo University of the Arts in 2015, animator Miyo Sato secured employment for the project by showcasing similar work in her portfolio. The user was involved in the production of several spirits and contributed to the development of the concluding sequence. Yuzuru Tachikawa, the director, aimed to create a distinctive and original production. The objective of his work was to present non-traditional visual notions within the realm of anime. Additionally, he issued a call for individuals proficient in paint-on-glass animation as a component of the project, to which Miyo Sato promptly replied. Sato undertook the task of animating the opening sequence, along with various additional sequences. Notably, one of the more exceptional moments involved the portrayal of Mob consuming rotten milk. The forceful manipulation of paint observed in the animation technique known as paint-on-glass, along with Sato's artistic ingenuity, facilitated the creation of extraordinary transitions that effectively distinctively conveyed a sense of hopelessness.

There was also a technique in which a still frame or scene from Episode 4 of the series was transformed into *sakuga*. The animation was executed by Sara Moroyuki. In the video titled *Breaking Down Mob Psycho 100's Incredible Animation [Episodes 2–12] | Animator Spotlight, The Canipa Effect (2016)* examines the animation of *Mob Psycho 100 (2016)*. In the context of animation production, Moroyuki, an individual key animator, undertakes the responsibility of executing the key animation for a certain episode independently. Undertaking solo key animation projects presents a formidable challenge since it necessitates the completion of a whole 20-minute animation within a specified timeframe, with sole responsibility for all aspects of the episode. Hence, it is inevitable that static frames would be used to interrupt the flow of action. Nevertheless, Moroyuki compensates for this deficiency with the implementation of innovative shot design, physical contortion, and editing techniques. In episode 4, the portrayal of Teruki's shadows exhibits a hazy and indistinct quality, strategically used to evoke a sense of unease and psychological unrest within the character. The tasks that were typically assigned to the finishing team are now imbued with animation. This demonstrates the potential for time efficiency and enhanced distinctiveness in animation. Episodes 3 and 10 of the animated series *Mob Psycho 100 (2016)* were executed by animators Kazuto Arai and Miso. Two persons who demonstrated their ability to produce complex effects animation have made the deliberate decision to collaborate on two scenarios that undeniably demanded the expertise of seasoned pros. In the third episode, Arai endeavoured to facilitate Dimple's ability to emit a beam from his mouth. This development suggests that the beam possesses considerable strength and potency. However, it is important to note that the depiction of the blast is not limited to a singular manner. In addition, there exists a remarkable period of frames preceding the blast, when sets of lines are strategically positioned around the character Dimple. This particular arrangement effectively contributes to the gradual intensification and anticipation of the impending event. Subsequently, Miso executed an aerial counteroffensive manoeuvre, which was aesthetically documented by the camera. In Episode 10, the team shows a resurgence by confronting a situation in which Teruki confronts the formidable fire strike unleashed by Miyagawa. Arai regains dominance, perceiving the fire as a rapid flow of fluid, accompanied by sparks and a forceful intensity that necessitates additional delineation and meticulous attention to particulars. The style of the flames also changes, this time focusing on the shape of the fire and how it flickers wildly, and you can clearly see where it switches from Arai to Miso.

As a result, the animators' team may animate more freely and creatively because they aren't concerned with the character models, making the show the most anticipated of all. The show possesses numerous qualities that render it highly compelling and deserving of viewership. In 2016, *Mob Psycho* emerged as a notable anime production, characterised by its *sakuga*, or high-quality animation. The series

explored the topics of individuality and self-perception, employing innovative animation methods and conceptual approaches to effectively convey these ideas. It's a show that won't be forgotten in a year, and the researcher may use it to display some of the best works by some of his favourite animators.

Developing Effective *Sakuga* Techniques to Be Used in The Researcher's Animation Projects

Upon conducting a review of the animation techniques used in the animated series *Mob Psycho 100* (2016), the researcher has identified some pertinent strategies that have the potential for integration into the researcher's next animation endeavours. The researcher must select techniques that can capture the audience's attention while ensuring that the shown animation possesses a profound sense of impact. Eliciting a sensation of both unease and exhilaration among the spectators. The researcher's animation project will be developed with an action-themed focus and a comedic element. Hence, the selection to incorporate Sakuga techniques inside the animation genre to be created, namely within the shonen series, as stated by Milford Library (2020), pertains to a certain type of anime referred to as "shonen anime," which is specifically tailored for a young male audience. In most instances, the central protagonist embodies a physically robust male figure, possessing proficient expertise in martial arts and the ability to augment his strength. Characters such as Son Goku from the anime series *Dragon Ball* and Monkey D. Luffy from the manga series *One Piece* exemplify the characteristics commonly associated with this particular genre. The profound esteem that these characters possess for their companions, together with their unwavering willingness to defend them, represent two of their most prominent attributes. *Mob Psycho 100* (2016) is categorised as a shonen series as well. The researcher posits that adhering to the "Tokusatsu" motif, a Japanese type of film and television drama characterised by superheroes and extraordinary effects, and drawing inspiration from Yoshimichi Kameda's sketchy line style, is a suitable technique to be employed. The animator's artistic approach is particularly well-suited for imbuing the action with a sense of impact that is essential for the researcher's animation project. According to *The Canipa Effect* (2016), the visual elements that require enhancement and serve to showcase animators' ingenuity are characterised by their roughness, sketchiness, unpredictable nature, and loudness. In his interview, Tachikawa affirmed that Yoshimichi Kameda was responsible for animating the entirety of the series *Mob Psycho 100* (2016). Furthermore, Tachikawa expressed his intention to present this work as his own and to elucidate the profound connection between ONE and Kameda's artistic contributions. Both the unpredictable nature of the mangaka and the equally dynamic animator consistently exceed expectations, offering an abundance of creative elements. Tachikawa emphasised the aspiration to generate novel visual concepts that have not yet been explored. In an ideal scenario, the experience of viewing *Mob Psycho 100* (2016) can be likened to the act of unveiling a container filled with exceptionally thrilling revelations, and the individual expressing this sentiment was not engaging in jest.

In his video, *The Canipa Effect* (2016) also discussed the glass painting style employed by Miyo Sato. The technique can be replicated through the utilisation of digital tools designed for the purpose of time management. The painted glass techniques employed in the researcher animation project were designed with the purpose of conveying the backstory of the characters. This artistic choice aimed to evoke a sense of nostalgia, akin to the nostalgic atmosphere seen in Episode 12 of *Mob Psycho 100* (2016). The inaugural episode of the introduction to *The Canipa Effect* (2016) references the character in question during its concluding video segment. In this proposed scenario, we suggest implementing a camera rotation technique to capture Mob's performance, which involves the display of a multitude of impressive visual effects. Prior to encountering the monster, we propose introducing an additional character that will execute a visually captivating walking sequence, filmed from a low-angle perspective. Furthermore, to enhance the climactic scene of the episode, it is proposed that the camera and the artist responsible for spirit-drawing collaborate in orchestrating a visually dynamic sequence including a combination of fluctuating lighting conditions and the dispersal of explosive liquid fragments. This sequence will culminate in the depiction of despondent crowds. This resource can serve as a valuable reference for effectively portraying characters who exhibit heightened displays of authority.

The final confrontation in the researcher's animation project can incorporate the impact frame style developed by Yuki Igarashi and Yutaka Nakamura. The utilisation of a frantic camera approach, characterised by rapid motions and a loss of focus on the subject, serves as an effective means to depict a heated fight scene; conveying the character's strong desire to swiftly conclude the fight. The technique can also serve as the focal point of the animation production. The animation technique used in Arai and Miso effectively utilises camera angles and framing to enhance the impact of a blast assault, as exemplified in Episode 3 during Dimple's attempt to execute such an attack. The utilisation of the "before blast frame" strategy serves as an indicator of an anticipated forceful attack. In addition to this, the utilisation of the "splash fire" style is intended for integration within the monster transformation sequence or after the attack scene, thereby enhancing the character's intimidating appearance.

Animetism Theory

As LaMarre (2009) states in his book, *The Anime Machine* (2009), the rapid movement of a robot, bullet, or train does not result in a shift of animetism's attention away from the window. It is still focused on examining the cross-, side-, and lateral effects of speed. Consequently, animetism serves to highlight the way speed defines the visual field into multiple layers or levels. Moreover, it gives the notion that the Earth is in a state of motion, as opposed to solely the train. In a YouTube video produced by the department of Film & Media Studies, in his analysis of the Anime Machine, LaMarre claims that anime predominantly exhibits a stylistic approach known as animetism. This approach involves the deliberate acknowledgment and incorporation of the flat layers of transparent celluloid that constitute the image, as opposed to concealing them. In contrast, cinematism, which aims to create the illusion of traversing a populated world, often relies on forward motion. The technique of Animetism involves the deliberate separation of the image into many planes, achieved by arranging translucent celluloid planes vertically on the animation stand. This method is employed to introduce a diverse range of visual elements within the image. The major focus of animetism lies in the movement on and between surfaces, as opposed to movement in the vertical dimension.

Chanoyun (2018), in his 2018 review of *The Anime Machine* (2009), stated that LaMarre compares cinematism and animetism to ballistic motion to show the difference between the two. As he puts it, cinematism turns "everywhere in the world into a target, and the eye becomes one with the bomb." He continues, "The essence of cinematism lies in the use of the mobile apparatuses of perception, which serve to give the viewer a sense of standing over and above the world and thus controlling it, and to collapse the distance between viewer and target, in the manner of the ballistic logic of instant strike or instant hit." Cinema, then, is about giving people power; it enables them "be in control" of their surroundings and learn more about them. Cinema was able to do this with a multi-plane camera, in which several planes would move up and down to make it look like the depth of the scene was changing. Although animetism "is not about movement into depth, but movement on and between surfaces," Animetism is when you like how open the spaces between layers feel or when you like how the layers come together. Cinematism is an aesthetic of movement that replicates forms of cinematic realism through animation. It's frequently characterised by realistic movement into depth or a recreation of cinematic space. Lamarre describes it this way:

“The essence of cinematism lies in the use of mobile apparatuses of perception, which serve (1) to give the viewer a sense of standing over and above the world and thus of controlling it, and (2) to collapse the distance between viewer and target, in the manner of the ballistic logic of instant strike or instant hit.” (Lamarre, 2009, p. 5).

Animetism, by contrast, is an aesthetics of movement that is not necessarily invested in this kind of reproduction of cinematic space. It is a kind of movement in animation that often favours what Lamarre terms “open compositing.” Lamarre describes animetism’s use of open compositing this way:

“[Animetism] Favours an “open compositing” in which layers of the image are allowed to move more independently of one another. While open compositing tends to work against

sensations of movement in depth, it makes possible other sensations of movement” (Lamarre, 2009, p. 37).

Anime lacks concern as much about how the picture is put together or how it hides the gaps between the different layers as the camera (or watching location) changes. But animetism is not the opposite of the arrangement. In an "open composing" type of anime, the different parts of the picture are encouraged to move around without being tied to each other. Open composition lets you have some types of movement experiences, but it often gets in the way of movement experiences that are based on depth. He says in the video *Speed Racer (2008), Cel Animation, and Animetism* that the elements in different layers will look like they move apart or closer together as they get smaller or bigger as you move the camera, which is like how anime simulates camera movements. The appearance of "in" or "out" is like having the curtains open and closed or being in very close focus. The way the characters are arranged here makes it clear that they weren't taken by the same camera but were added together as different layers.

The movie incorporates the technique of quick lateral camera movement, a characteristic aspect commonly found in anime. In the field of animation, a common tendency is observed wherein lateral camera movement is favoured over full animation, serving as an illustrative instance of animation reduction. This preference stems from its ability to facilitate workload efficiency for animators. In order to simulate a rapid lateral camera movement, animators have the ability to use abstract motion lines on a loop, as opposed to redrawing perspectival shifts for each individual frame. Nevertheless, outcomes might be regarded as a conceptual representation of pure motion rather than an accurate portrayal of movement in physical space.

Animetism is a technique that involves the manipulation of the relative movement of several layers. This is a technique for modifying the multiplanar image. The camera's viewing location no longer retains its privilege and is relegated to simply becoming another layer. This phenomenon is observable throughout the animated sequences of the show, namely in the combat scenes, wherein the background exhibits minimal movement while the characters engage in motion.

RESEARCH METHODOLOGY

To obtain a better understanding of the issue that this research is analysing, a study design must be conducted. Marek (2019) states that the utilisation of this research design will facilitate the examination of a previously explored theory, specifically the theory of animetism as initially expounded by Thomas Lamarre in his seminal work *The Anime Machine* (2009), widely regarded as one of the most significant publications dedicated to the study of animation, particularly within the field of anime. The collected material relating to the issue is largely supportive of this study. However, to ensure the credibility of the obtained information and ascertain its appropriateness for supporting this study, various comparisons will be conducted.

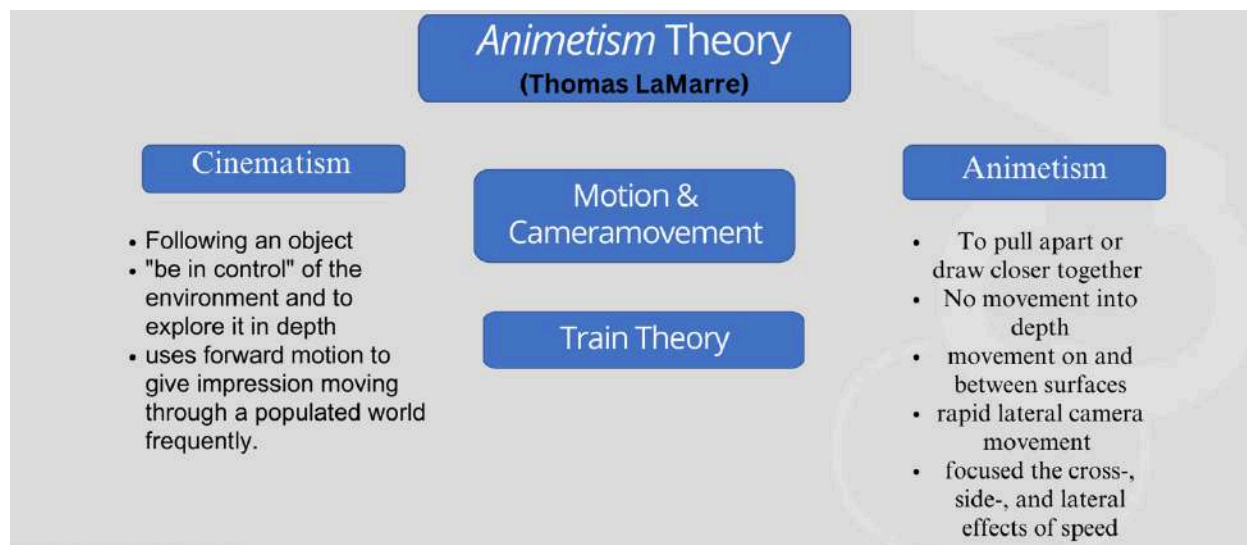


Figure 1. Theoretical Framework
(Source: Original, 2023)

In this research paper, the researcher uses qualitative research methodology, as the study only concentrates on the observation and categorization of non-statistical data derived from the television animation series *Mob Psycho 100* (2016). During the data collection phase, researchers commonly analyse observations for trends (Savenye & Robinson, 2004). The selection of a qualitative approach, such as a field study, ethnographic content analysis, oral history, biography, or unobtrusive research, together with the choice of materials, such as field notes, documents, audiotapes, and videotapes, has an impact on the structure and methodology of the analysis.

FINDINGS

In the research findings, *Sakuga* techniques are based on their creator or by a famous key animation artist. A comment from a Reddit post "Most of the animation staples are named not after their original users, but after the most famous ones."- Quartandoff (2020). This pertains to phenomena such as the "Gainax bounce," which first emerged in 1981, and the "Obari pose," initially popularised by Shin Matsuo. These techniques encompass various elements, including the Ebata walk, Yutapon Cubes, Obari Punch, and others.



Figure 2. Ebata Walk technique from One Punch Man OVA 1
(Source: <https://www.sakugabooru.com/post/show/63684>)

Article from WordPress stated that Ryouma Ebata is well known as the man who animates walking. Ebata Walk is currently a phrase named after his walking animation. Undoubtedly, there are further facets to his expertise; he possesses exceptional aptitude as a character animator, effectively harmonising exaggerated motion with more realistic elements to create highly memorable and charismatic moments. Yet, it is his approach to animating uncomplicated sequences depicting characters strolling that truly distinguishes his work. Examples of simple actions that can occur during physical movement include a character altering their balance, making an accidental error in their step, or executing a movement involving a rotation of the hip joint (Relyat08, 2016).

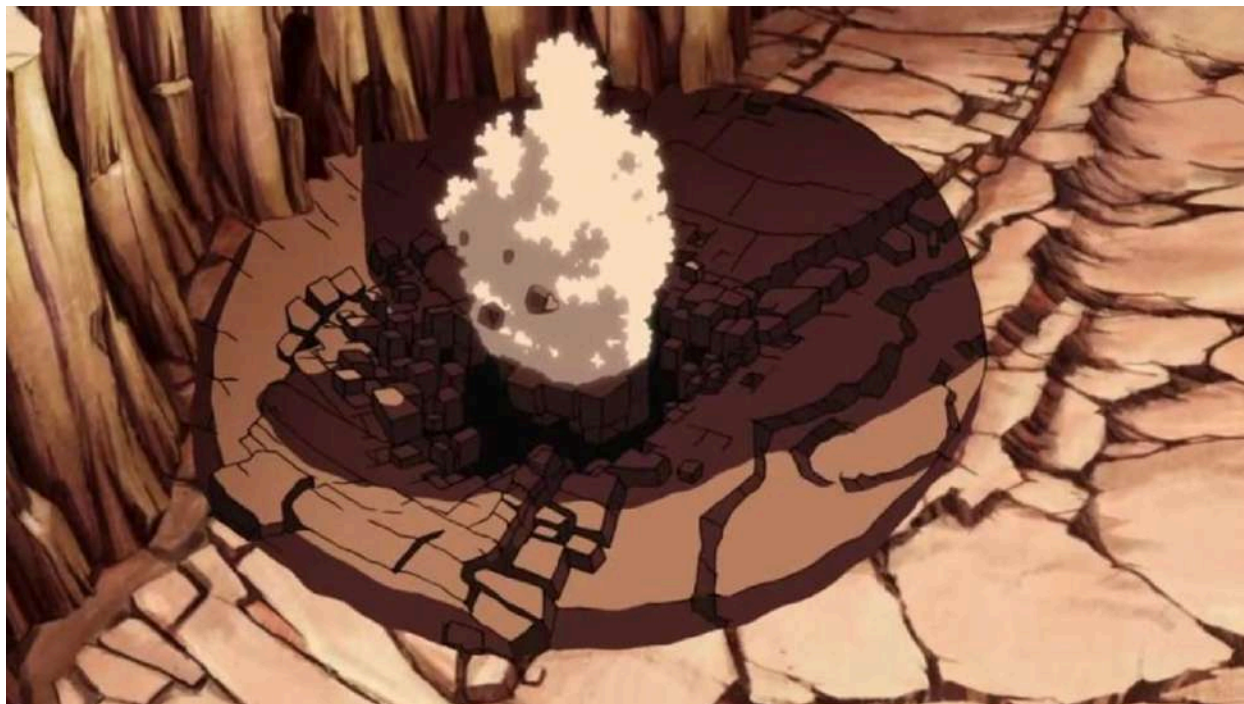


Figure 3. Yutapon cube technique from Space Dandy
(Source: <https://www.sakugabooru.com/post/show/63684>)

In his remark on the website Quora.com, Kevin Z. (n.d.) expressed his viewpoint of Yutapon, primarily focusing on the creation of aesthetically pleasing fragments. He argued that cubes had a greater sense of satisfaction and beauty compared to asymmetrical triangles. Furthermore, it should be noted that the decision to adapt anime from manga is often at the discretion of the director. All the illustrations are created by a single individual, with the assistance of a small team of editors. Consequently, most of the combat sequences depicted in manga have a reduced presence of debris compared to their counterparts in anime.



Figure 4. Obari Punch technique that applies in Pokémon
(Source: <https://www.sakugabooru.com/post/show/63684>)

Matteowatz (2021) in his writing from animtudes.com elaborates on the *sakuga technique* “The Obari punch” is a little more complicated than a straightforward punch to the camera. The defining characteristic of Obari's animation style is the notable emphasis placed on anticipation during the execution of punches. As noted by Kraker2k, an expert in Obari's work, the Obari punch can be deconstructed into three or four distinct postures. Of particular significance are the arm retracting motion and the forceful protrusion of the chest. In addition to its evident qualities, the Obari punch showcases a keen understanding of anatomical structures, whether human or mechanical, as well as a discernible sense of rhythmic coordination. Undoubtedly, animating the frontal position poses a consistent challenge, whereas the intermediate stances allow fluidity and natural movement.



Figure 5. Animatic from Spider-Man: Across the Spider-Verse used of Kutsuna Lighting
(Source: @SpencerWan/Twitter.com, 2023)

Kutsuna Lighting is a visual phenomenon that encompasses ray animations that emulate the movement of lightning. This distinctive visual effect is distinguished by the presence of zigzag patterns, which are skillfully crafted by Kenichi Kutsuna, as stated by BlackSakuga (n.d.) on Sakugabooru.



Figure 6. Showing animation effect in a single from Mob Psycho 100 episode 1
(Source: Sakugaespreso.com, 2021)

The analysis of *Sakuga* in the context of *Mob Psycho 100* (2016) reveals several noteworthy aspects. These include the presence of unconstrained and dynamic effects animation, the seamless execution of camera movements, and the incorporation of highly expressive cartoon facial expressions that evoke humour.



Figure 7. A scene where Mob exercise evil spirit in episode 1
(Source: Sakugaespreso.com, 2021)

The primary aspect that needs emphasis is the exceptional integration of colour design and compositing, which effectively unifies the entirety of the scene. The purpose behind this cut is to showcase Mob's psychic capabilities to the viewers, hence it is fitting that Mob's power manifests through the most luminous and vibrant being within the given space. During the process of exorcism, the spirit exhibits a rapid sequence of vibrant neon hues, accompanied by the emission of sparks and flashing electrical arcs, resulting in a luminous display reminiscent of a rainbow. The rapid changes in colour schemes and compositing effects create a notable phenomenon known as "sub-drawing movement," which enhances the intensity of the scene without diminishing the liveliness of any individual keyframe.



Figure 8. Showing Sakuga of Dimple blown away by Mob barrier
(Source: @Yuyucow/Twitter.com, 2016)

The presence of light and the arrangement of lines in the image are indicative of a sense of gravity and dominance. The magnitude of the explosion appears relatively unremarkable in comparison to the protagonist's prior encounters in psychic battles. However, this perception is influenced by the show's manipulation of our perception. The inclusion of visually striking elements, such as vibrant background animation and whimsical impact frames reminiscent of ink, makes it challenging for this explosion to evoke a lasting impression amidst the consistently exceptional artistry displayed throughout the series.

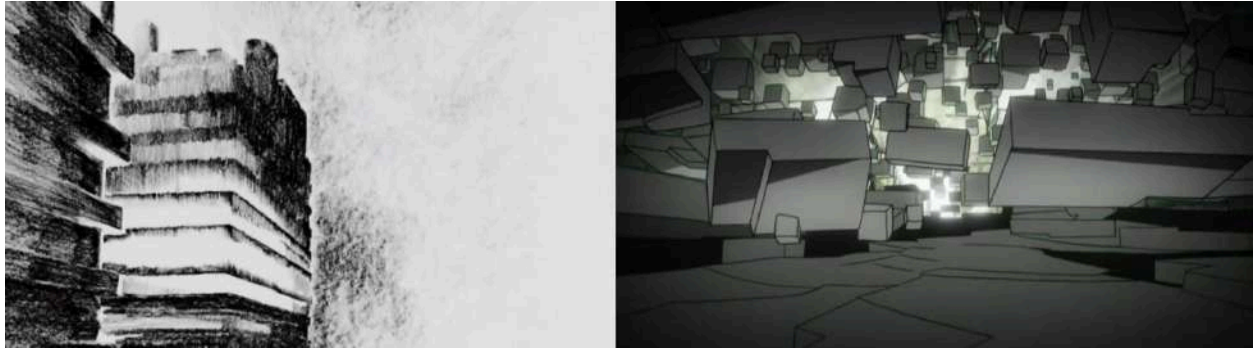


Figure 9. Yutapon technique is used when the characters hit the ground
(Source: <https://www.sakugabooru.com/post/show/63684>)

Yutaka Nakamura was responsible for animating the action ending, which prominently showcased his distinctive stylistic characteristics, including impact frames and the renowned "Yutapon cubes." The utilisation of a transition from backdrop animation to background art is evident throughout his work.



Figure 10. The application of the sakuga technique called Wakame Shadow in the researcher's final year project
(Source: Original, 2023)

The animation sequence incorporates lighting effects to visually emphasise a powerful assault. Additionally, the researcher opted to incorporate the Wakame Shadow *sakuga* technique, which involves casting a shadow in the shape of seaweed-like strands around the character, to enhance the desired visual impression.



Figure 11. Punch sequence using *sakuga* technique in the researcher's final year project
(Source: Original, 2023)

To deliver a forceful impact in my work, the researcher used *Sakuga* technique developed by Obari. This style involves incorporating elements such as subtle movements indicating the buildup of anticipation before a punch is thrown by a monstrous creature, as well as utilising bold line sketches to convey the menacing nature of the impending attack.



Figure 12. The use of squash and stretch technique in the researcher's final year project
(Source: Original, 2023)

To enhance the forceful effect of the punch strike, the researcher developed a strategy involving the use of squash and stretch techniques on the monster's physique. Specifically, the posterior region of the creature's body would undergo elongation, while the front portion would experience compression as a result of the forceful hit delivered by the mecha's fist. Additionally, the researcher applied a lighting effect within a sub-drawing, wherein the lighting changes within a single frame.

CONCLUSION

In conclusion, the term *Sakuga* has undergone significant evolution since its creation, with its definition continuously expanding and broadening over time. Initially denoting the entirety of the animation domain, it has transformed into a recognition and commemoration of the skilled artisans responsible for its creation. The practice of *Sakuga* has emerged as a method of acknowledging the skills and dedication of animators in the creation of exceptional animation, through the systematic preservation and documentation of their artistic contributions. *Sakuga*, as a production strategy, is not based upon accidental circumstances or chance occurrences, but rather is a deliberate and premeditated process that involves the utilisation of proficient and seasoned animators. The artists demonstrate their creative abilities, expertise, and passion through their artistic endeavours, thereby producing visually captivating and intriguing instances that enhance the overall quality of the animation.

Moreover, *Sakuga* serves as a highly effective instrument for crafting visually captivating and dynamically animated sequences. These instances not only captivate audiences but also showcase the exceptional skills of the animators, establishing novel benchmarks for the quality of animation and advancing the boundaries of this artistic medium. The significance of *sakuga* persists as an important element in the ongoing development of the animation industry. Further research and exploration of this methodology, in conjunction with advancements in technology and animation software, will undoubtedly provide an array of visually captivating and emotionally resonant artistic creations in the forthcoming years. *Sakuga* animations are produced by a diverse range of methods. To enhance the visual appeal and realism of their sequences, animators employ a variety of approaches, including intricate character designs, fluid animation, meticulous attention to detail, and the strategic use of dynamic camera angles. The enhanced level of skill enhances the viewer's experience by immersing them in the narrative and intensifying the emotional resonance of the animation.

The art form known as *Sakuga* deserves recognition and appreciation, extending beyond its mere technical role within the field of animation. As viewers, we are afforded the privilege of witnessing the tangible outcomes of animators' unwavering commitment and diligent efforts. Through their invaluable contributions, the field of animation is elevated, hence igniting a profound sense of inspiration within forthcoming generations of artistic individuals.

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Exploring the Application of Multiple Contradictory Space Elements and Principles of M.C. Escher

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ABSTRACT

M.C. Escher, a renowned graphic artist, merged art and science to produce seemingly ‘unreasonable’ contradictory spaces that expand our vision into an infinite loop. Numerous designs have been influenced by his works. However, findings from the literature reveal that most adapt only a single contradictory space element or principle, while few explore more intriguing visual effects by incorporating multiple elements and principles. This study aims to explore the application of multiple Escher’s contradictory space elements through creative practice. A two-phase practice-based research approach was used. A graphic illustration was created in the first phase and was used as a stimulus in the second phase for semi-structured interviews with five conveniently selected individuals to assess their views on works integrating contradictory spatial elements and principles. The findings revealed contrasting opinions: while visitors found the work stimulating, triggering associations with the depicted subjects’ symbolic meanings and producing exciting spatial effects, they also perceived a lack of compositional order. While the creative practice and outcome could provide valuable references for other creative practitioners, the qualitative findings may inspire future research in related areas.

Keywords: *M.C. Escher, Contradictory Spaces, Practice-based Research, Graphic Illustration, Stimuli*

INTRODUCTION

M.C. Escher (1898-1972), a renowned Dutch visual illusionist painter, made significant contributions to the field of modern design in the first half of the 20th century. Known as an artist “difficult to be classified by faction”, Escher’s unique contradictory composition concept has influenced many aspects of

design. By exploring different principles of spatial composition and key attributes of three-dimensional (3D) design, Escher utilised creative manipulation of light and shadow, line, form, size, and proportion to extend the visual expression of contradictory space in his works (Amorim, 2019). Contradictory space, as defined by Ernst and Escher (2022), is the use of visual illusion on the 2D plane to create an erroneous expression of reality that appears in 3D. Escher's works defy the principles of perspective and create a mysterious visual illusion.

While previous studies on Escher's art have predominantly focused on scientific and psychological perspectives (e.g., Ivars, 2001; Ede, 2005; Gombrich, 2000), few have examined the artistic aspects of his works. In light of this, the current study argues for a need to summarise different elements and principles of Escher's contradictory spaces in the creation of graphic illustrations, showcasing the creative possibilities of his artistic concepts and ideas. In an era of commercialization, illustration creation has become increasingly static (Little, 2017), leading to visual fatigue. Therefore, it is crucial to apply innovative ideas in illustration design. Furthermore, Udris-Borodavko and Pavliuk (2021) suggest that modern illustration design should explore more styles that integrate ideas from science, psychology, philosophy, and other fields.

Merrell (2009) points out that using visual illusion in illustration design can attract and enhance viewers' attention, stimulating their desire for creative exploration and thinking. Thus, the overall purpose of the study is to explore the integration of Escher's contradictory space elements and principles into graphic illustration design and investigate how people perceive these creations.

LITERATURE REVIEW

M.C Escher's Life and His Artistic Career

M.C. Escher (1898-1972) was an artist who defied classification (Ernst & Escher, 2022). Living in an era where modernism prevailed in the West, Escher's artistic career spanned significant events and diverse experiences. The modernist artistic trend, which emerged in the 20th century, differed greatly from traditional art forms and ideologies (Emmer, 1984). Throughout his career, Escher's travels and life experiences significantly influenced his creative output.

The Elements of Escher's Contradictory Space Concept

Penrose Triangle

The Penrose Triangle, as shown in **Figure 1**, is one of many impossible objects first made by Swedish artist Oscar Reutersvard in 1934. British mathematician and physicist Roger Penrose and his father also designed and promoted this pattern, and called it the impossibility of its purest form in the February 1958 issue of *British Psychological Monthly* (Draper, 1978).



Figure 1. Penrose Triangle

(Source: <https://www.illusionsindex.org/i/impossible-triangle>)

As **Figure 2** shows, on the stairs to the roof, Escher used ‘the Impossible Penrose Triangle’ to create an impossible space, turning the stairs that were originally on the same plane into an infinite spiral (Penrose & Penrose, 1958). Looking in the direction of the characters, the stairs seem to never end. The stairs on the top of the building cannot tell which is the highest point and which is the lowest point. It is just a bizarre architectural work drawn by Escher on a 2D surface based on the element of Penrose Triangle (Goffi, 2015).

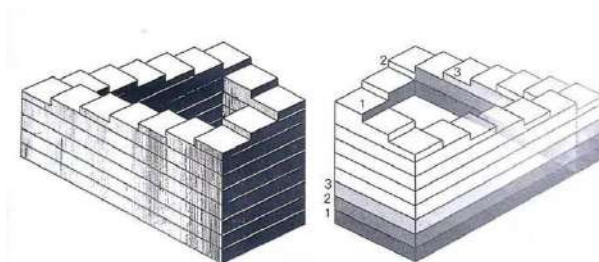


Figure 2. Application of Penrose Triangle in Escher’s Works

(Source: *Ernst and Escher, 2022*)

The *Waterfall* is one of Escher’s most renowned works. As **Figure 3** illustrates, the analytical diagram reveals that the image is primarily composed of two Penrose triangles. The two zigzagging waterways at the edge of the Penrose Triangle are extended one level above their original location at the end of the channel. This painting also features a creative method of overlaying multiple spaces. The Penrose Triangle is situated in the same flat and middle dimensions. Water ultimately forms a waterfall in this channel, which then powers a waterwheel through the flowing water of a wet cloth. Undoubtedly, the waterfall has become a completely closed system, driving the waterwheel like a perpetual motion machine. Although this violates the law of conservation of energy, upon closer examination, the image still employs people’s linear logical thinking patterns and leads them into this impossible space unawares (Amorim, 2019).

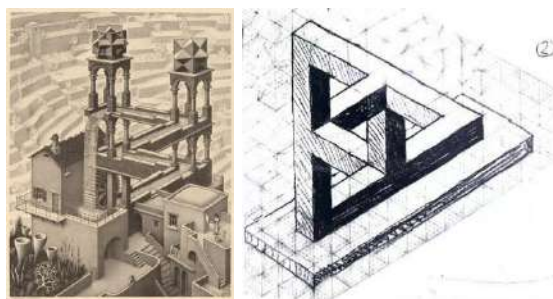


Figure 3. Waterfall, 1961 and Penrose Triangle in Waterfall
(Source: Ernst and Escher, 2022)

Mobius Strip

Art gives people a more vivid phenomenon of reality and also gives people a deeper insight into the formal structure of reality. Many of Escher's prints reflect the principle of the Mobius Strip in topology (Emmer & Schattschneider, 2007). For example, the works created in 1961 and 1963 *Mobius Strip I* and *Mobius Strip II* (see **Figure 4**). In the book *The Golden Ribbon* by Hofstadter (2000), Escher's works of this type of element are explained in detail. The connection between topology and relativity in Escher's art is also discussed in the book.



Figure 4. Mobius Strip I and Mobius Strip II
(Source: Ernst and Escher, 2022)

Escher's favourite graphic is undoubtedly the Mobius Strip. It can be seen from the path diagram of the ant tracing in *Mobius Strip II* (see **Figure 4** right-side) that this belt-like shape appears to have two different faces, neither a starting point nor an ending point. If a person walks on the geometric plane, no matter where he or she starts, he or she will eventually return to the original starting point (Ovios, 2003). Assuming that one side of these two continuous surfaces is space and the other side is time, this characteristic cannot help but remind people that the unity of time and space in relativity is 3D space as one, time as another, the unity of space and time.

Riemann Surface

A Riemann Surface is a surface proposed by Riemann, a German mathematician to imagine a single-valued domain for a multi-valued analytic function. In simpler terms, a Riemann surface is a connected one-dimensional complex manifold (Zhu & Li, 2022).

Based on this idea, Escher created a lithograph *Gallery* in 1956 (see **Figure 5** left-side). The lower left corner of the picture is the entrance to the gallery, where a grand exhibition is being held. There is a young man on the left who is looking at the work in front of him attentively at the entrance (Emmer &

Schattschneider, 2007). There is a boat in the work, and there are infinite buildings on the pier in the distance, the entrance of the building is both the entrance of the gallery, and the gallery holding an exhibition.

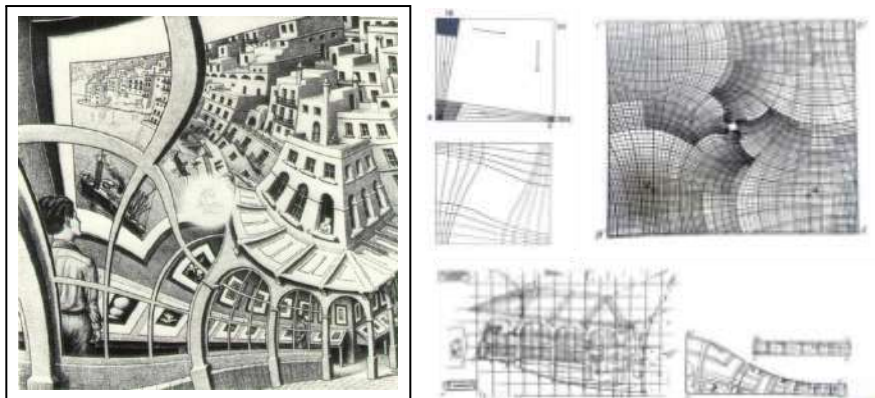


Figure 5. Gallery, 1946 and the Gallery Grid Graph
(Source: Ernst and Escher, 2022)

As **Figure 5** right-side shown, the grid diagram in the upper left corner features some irregular quadrilaterals arranged in a counterclockwise order. This grid will continue to enlarge. Initially, the original quadrilateral is enlarged four times when it develops to the left. When it develops upward, it is enlarged by 64 times and then 256 times. In other words, after multiple expansions, the original 1cm figure will transform into a trapezoid measuring approximately 2.5 metres (Ernst & Escher, 2022).

Escher underwent twofold expansion during the creative process, possibly because the third level and subsequent stages could only be expressed through mathematics (Sack, 2013). As **Figure 5** demonstrates, the space of the *Gallery* has reached its maximum capacity, and further expansion and enlargement are no longer possible within it. Through these two rheological expansions, Escher managed to bring this magical gallery to life in the painting, only to vanish into nothingness.

The Principles of Escher's Contradictory Space Concept

Relativity of Vanishing Point

In the process of perspective projection, a set of parallel lines parallel to the projection surface will maintain their parallelism in the projection, while parallel lines that are not parallel to the projection surface will eventually converge to a single point, which is what we refer to as the vanishing point (Sizemore, 2017). This is the interpretation of the vanishing point in perspective. Due to the difference in the angle formed between the line segment and the picture, the vanishing point can assume various roles, such as the focus, sky point, residual point, location, and so on.

From this explanation, it is clear that the vanishing point can represent various points, such as the centre point, the residual point, the location, and so on. Therefore, the point it represents in the picture depends on the artist's creative intention (Sizemore, 2017). Escher ingeniously discovered a new principle, which is the relativity of vanishing points.

As **Figure 6** left-side shows, Escher used the zenith as a vanishing point for the first time in his woodcut *We Will Come Out* (1946, woodcut) for the Dutch Library Book Club. In **Figure 6** right-side, Escher's *The Other Side I* (1946, copper engraving), the vanishing point of space can be seen from the windows in four directions and the bird standing on the window and the cosmic starry sky as the background at the same time (Emmer & Schattschneider, 2007). The sky point, the location and the

horizon point are integrated, so that a seemingly normal space perspective work is subverted by Escher by using the principle of vanishing point relativity.

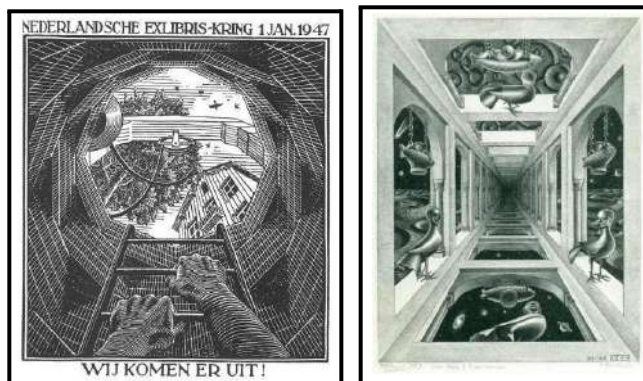


Figure 6. We Will Come Out and The Other Side I
(Source: Ernst and Escher, 2022)

The New Discovery of Cubic Space Filling

In **Figure 7**, *Ladder Palace* (1951, lithograph), Escher's use of curved perspective can be observed. These curves significantly enhance the spatial depth of the image (Ernst & Escher, 2022). Monsters, undoubtedly, are a means to deceive people. From the perspective of this little monster's space, everything might seem normal, but upon careful observation, its peculiar nature becomes apparent. At the same time, we notice two vanishing points in the sky. These two vanishing points serve as both the sky point and the ground simultaneously, making it impossible to determine the top and bottom of this beautiful face, and the real space becomes distorted once again (Escher, 1992). *Ladder Palace* differs slightly from Escher's previous works. In this fascinating space, the unique combination and structure make the trend cycle of another space an infinite loop (Escher & Bool, 1992). Artists undergo a long and complex dialectical process during the course of artistic creation. Through repeated revisions, their artistic creations meet their own psychological expectations. There is always a strong subjective consciousness among artists during this process. Therefore, each cognitive strategy is associated with the form and symbolic effect of the image it addresses (Papucha, 2019).

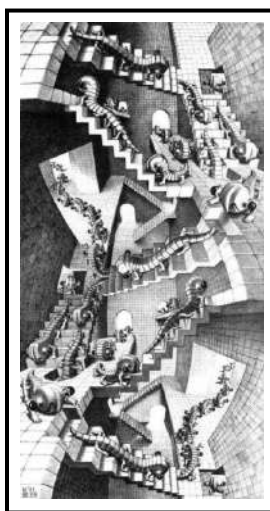


Figure 7. Ladder Palace
(Source: Ernst and Escher, 2022)

Curved Perspective

Today, when people use a camera without macro adjustment to shoot at close range, straight-line objects appear curved, and the same is true for our eyes (Tanizaki & Takahashi, 2021). When looking up, the straight line that was originally parallel to the ground or perpendicular to the ground will become a curved line in the painting, which is what is called curved perspective. The principle of curved perspective was not discovered by Escher, but artists at that time simply applied this principle to artistic creation to enhance the visual effect of their works (Amorim, 2019). It was after Escher discovered the relativity of the vanishing point that he made this new discovery, which emerged from a multitude of creative experiments.

In 1947, Escher's lithograph *High and Low* utilised a novel discovery, as seen in **Figure 8**. Upon close inspection, it's clear that both the upper and lower sections incorporate curved perspective, including the columns, vaults, and trees on the right (Escher, 1992). The building's original direction has been shifted, and although this may not be immediately apparent, a deeper understanding of the image's spatial depth is revealed upon further examination. This work not only employs curved perspective but also the relativity of the vanishing point, producing a stunning effect (Ernst & Escher, 2022). The vanishing point serves as a link between the top and bottom, representing both the sky point of the lower half and the location of the upper half, subtly creating a perfect unity between the two parts of the image (Sizemore, 2017).



Figure 8. High and Low
(Source: Ernst and Escher,2022)

In this work, Escher once again presented an impossible world. This exquisite impossible space structure perfectly tricks our vision on the plane. The picture's two distinct perspectives appear logical, yet both are seamlessly integrated and equally significant, making it impossible to determine the real subject (Ernst & Escher, 2022). This seemingly incompatible approach constituted a perfect fusion for Escher. Since then, he continuously delved into new contradictions of space from science and philosophy, creating numerous contradictory space works in various styles (Escher & Bool, 1992). According to

Escher, space is no longer the space we encounter in our daily lives. His works reveal his exploration and development of deep space.

The Impact Escher's Work in Modern Design Works

Escher's unique contradictory space constitution concept, characterised by its rational thinking, not only conveys his distinctive ideas but also demonstrates his innovative approach (Gombrich, 2000). The endless steps and streams frequently featured in his works not only captivate viewers visually but also introduce a fresh concept for modern art design. Until now, more and more buildings, movies, and games have further extended the definition of space, such as the movie *Inception* (see **Figure 9** left-side) and the game *Monument Valley* (see **Figure 9** right-side).



Figure 9. The Stairs in Movie Inception and Monument Valley

(Source: <https://www.imdb.com/title/tt1375666>, <https://www.monumentvalleygame.com/mvpc>)

As illustrated in **Figure 9** right-side, the game *Monument Valley* allows players to navigate between different worlds and exit the monument maze by shifting, rotating, and flipping upside down (Kibby, 2016). These path connections, which integrate Escher's contradictory space concept, challenge common sense and create an intriguing spatial experience. *La Muralla Roja* is akin to a real-life *Monument Valley* (refer to **Figure 10** left-side). This magical castle-like structure appears as if it's straight out of an Escher work, with an intricate design that changes perspective impressively. When bathed in daylight, it creates a striking visual impact.



Figure 10. La Muralla Roja Design by Ricardo Bofill and China Central Television's Building

(Source: <https://ricardobofill.com/projects/la-muralla-roja>, Yeti-Hunter, 2017)

CCTV's building, inspired by the Mobius Strip (see **Figure 10** right-side), was designed by Ole Scheeren and Rem Koolhaas. It connects the four functional areas of the building to form a ring, creating a seamless whole, much like the Mobius Strip. Viewed from the side, it appears as an 'S', while from the front, it looks like an 'O', making it unique and subtle (Lin et al., 2018). Despite the absence of curves on

the exterior, the building exudes dynamism, with small angular deviations hinting at a distorted treatment of space.

The renowned contemporary designer Shigeo Fukuda was once captivated by Escher's works. As illustrated in **Figure 11**, Shigeo Fukuda employed cubes and the principles of impossible figures to create an astonishing contradictory space (Shim, 2020).

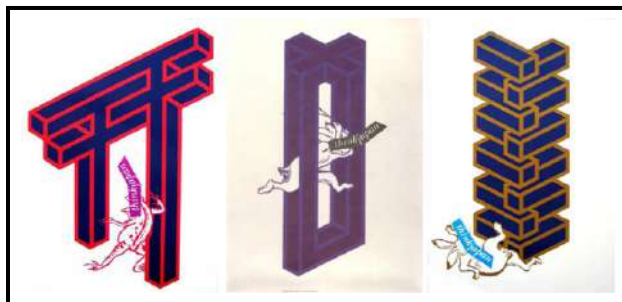


Figure 11. Shigeo Fukuda's Poster
(Source: <https://www.artsy.net/artist/shigeo-fukuda>)

As **Figure 12** demonstrates, there are striking similarities between the style of Gunter Rambow's works and those of Escher. In his book series poster designs, we can observe the contradictory space relationship created by the interaction of various elements and books (Vinnychuk et al., 2019). Much like Escher's *Drawing Hands*, Gunter Rambow employs books and other elements to transform space, resulting in a series of intriguing contradictions. He transcends the limitations of two-dimensional space, creating a powerful sense of depth that sparks people's imagination and leaves a lasting impression.



Figure 12. Poster Series by Gunter Rambow
(Source: <https://www.gunter-rambow.com>)

Through observation and a review of previous literature, it has been noted that many designs are created using a single element or principle. For instance, Gunter Rambow's series of book posters solely refers to the paradox of Escher's *Drawing Hands*; Shigeo Fukuda developed a collection of posters using only impossible figures. Despite the widespread study and appreciation of Escher's works, Zhang and Wang (2023) argue that there is still much potential for exploring the manipulation of elements and principles from his creations. They emphasise that the symmetry and mirror symmetry present in Escher's works can be expanded to generate various visual expressions. Furthermore, Tressoldi (2012) suggests that the sense of space and depth in Escher's works can be further explored by employing different techniques and methods. In this context, the study posits that it is necessary to summarise the various

elements and principles of Escher's contradictory spaces in the creation of graphic illustrations to showcase the creative potential of his artistic concepts and ideas. This research aims to investigate the possibility of combining contradictory space elements and principles. The specific research questions are as follows:

1. How to integrate multiple Escher's contradictory space elements and principles for the creation of a graphic illustration?
2. What are the opinions of the viewers on the created graphic illustration using Escher's contradictory space elements and principles?

RESEARCH METHODOLOGY

Research Design and Methods

Practice-based research is a research approach that is rooted in practical experience, fusing practice with theory, and emphasising the active involvement of practitioners in the research process (Gibson, 2018). This approach centres on practical operations, experiences, and knowledge, combining them with theoretical understanding and academic theories. Practice-based research is primarily utilised in artistic, design, performance, and other creative fields, where practitioners typically investigate, test, and validate their ideas through practical applications (Gibson, 2018). Given the nature of this study, a practice-based research approach is deemed suitable. More specifically, this study consists of two phases.

Phase 1: Creative Practice

Based on the analysis of previous literature, Escher's contradictory space elements are the Penrose Triangle, Mobius Strip, and Riemann Surface. Each of these three impossible figures has its own unique expression. Furthermore, the basic principles include changing the vanishing point of the picture, filling the picture, and employing new methods of curved perspective. These elements and principles serve as important references in the creation of his works and therefore were considered in the creative practice (first phase) of the study.

The creation process of the work lasted approximately two months. The creative process employed was based on the seven steps proposed by Black (2019), Chae (2019), and Rudd (2022). They mentioned that creativity is the essence and soul of most reflective design ideas (Black, 2019). It is primarily manifested in the imagination, fantasy, analysis, reasoning, and creative thinking abilities of the design project, which ultimately generate a great creative idea and capture people's hearts (Chae, 2019). The illustration design is unrestricted in form, and the creation method is highly versatile; it is natural to express the artistic form through painting (Rudd, 2022). Specifically, the creative practice of the study employed the following steps when creating the graphic illustration to answer the first research question:

1. Establishing the theme: First, establish a clear design theme. This work will be based on this theme.
2. Gathering materials: Collect materials related to the theme of the illustration to aid in the later creation process.
3. Meditating on creativity: Reflect on creativity based on the collected materials and find inspiration to create an illustration.
4. Determining the creation method: Select the appropriate creative method according to the inspiration and ideas.
5. Establishing a style: Choose the most suitable style for the illustration.

6. Sketching and documentation: Based on the previous accumulation, quickly sketch the inspiration, creating a comprehensive sketch. This becomes the foundation for later creative development.
7. Creating illustrations: According to the completed sketches, integrate the elements and principles of contradictory space to fill the picture, and ultimately complete the illustration creation.

Phase 2: Semi-structured Interview

After completing the work, to address the second research question, the researcher collected people's opinions about the created work. In other words, the created graphic illustration served as a stimulus in the second phase of the study. The researcher took the finished piece to a theatre where it could be exhibited offline, and observed the viewers' reactions to the images through a camera, gathering some of the viewers' opinions about the works.

The exhibition location is a relatively prosperous local shopping street, and most of the visitors are young people aged 20-30. According to Van Eck (2015), young people generally have a hobby of watching films, and most of them are literary youths, who are sensitive to artworks and have a better acceptance of new things. Considering the reliability and foresight of the interview results, such people are suitable to be interviewed. Some studies have indicated that viewers only need 5 seconds to browse the general content of an entire image, after which they are inclined to explore the details (You et al., 2016). Therefore, the second phase of this study observed and selected viewers who spent more than 30 seconds in front of the work for the interview.



Figure 13. Location of the Exhibition and the Situation of the Visitors
 (Source: Captured by the author)

The observation process lasted for five days. As shown in **Figure 13**, the work was displayed in a small theatre. Based on the cashier data and registration forms in the theatre, the total number of observed visitors is 271. In this study, viewers who expressed interest upon introduction by the staff were counted, as reflected in the 'Interested' column of **Table 1**. According to prior research, viewers who spent more than 30 seconds in front of the image showed interest in the artwork (Xu & Ye, 2020). Therefore, these viewers were considered long-stayers and were included in the 'Long-Stayers' category in **Table 2**. This suggests that the stimulus had initially resonated with the viewers, prompting them to explore and closely inspect the works.

Table 1 Number of Interest Visitors Within the Five Days (N=271).

Day	Total Number	Interested	Percentage of interest
First	78	45	57.69%
Second	65	38	58.46%
Third	30	15	50.00%
Fourth	42	30	71.42%
Fifth	56	41	73.21%
Total	271	169	

Table 2 Number of Long-stayers Within the Five Days (N=271).

Day	Total Number	Long-stayers	Percentage of Long-stayers
First	78	30	38.46%
Second	65	31	47.69%
Third	30	10	33.33%
Fourth	42	22	52.38%
Fifth	56	21	37.50%
Total	271	114	

This process selected one visitor per day who observed for more than 30 seconds, left their contact information, and was informed about a gift. In other words, convenience sampling was used. They were then scheduled to receive the prize and underwent a semi-structured interview. Eventually, five participants were selected for semi-structured interviews.

The interviews took place in the rest area of the theatre where the works are displayed, making it convenient for the interviewees to observe the works at any time. The entire interview process was conducted in Chinese. The interview duration for each interviewee is approximately 20 minutes. Throughout the process, two recording devices were set up to document the interview. Prior to the interview, advance communication with the interviewee was conducted to confirm the interview location and time. Upon collection of the data, it was transcribed and then translated into English.

The study employed thematic analysis to analyse the content of the interviews and summarise the overlapping content into themes, as suggested by Braun and Clarke (2013). The collected data will be transformed into information through the process of processing, organising, and analysing using NVivo software.

FINDINGS

Application of Multiple elements and principles in graphic illustration

The four illustrations presented in **Figure 14** (left-side) are constructed using impossible figures of the Penrose Triangle. The Penrose triangle appears to be solid, consisting of three rectangles with square cross-sections. These three rectangles are combined to form a triangle, yet the angle between any two rectangles seems to be correct. These properties cannot be realised in any object within normal three-dimensional space. Firstly, various points, lines, and surfaces are combined and deformed, undergoing further deformation. During this process of deformation, different types of spaces within the image are connected through lines and surfaces, resulting in a contradictory, circular, and paradoxical composition. The shapes and lines are abstracted from conventional materials.

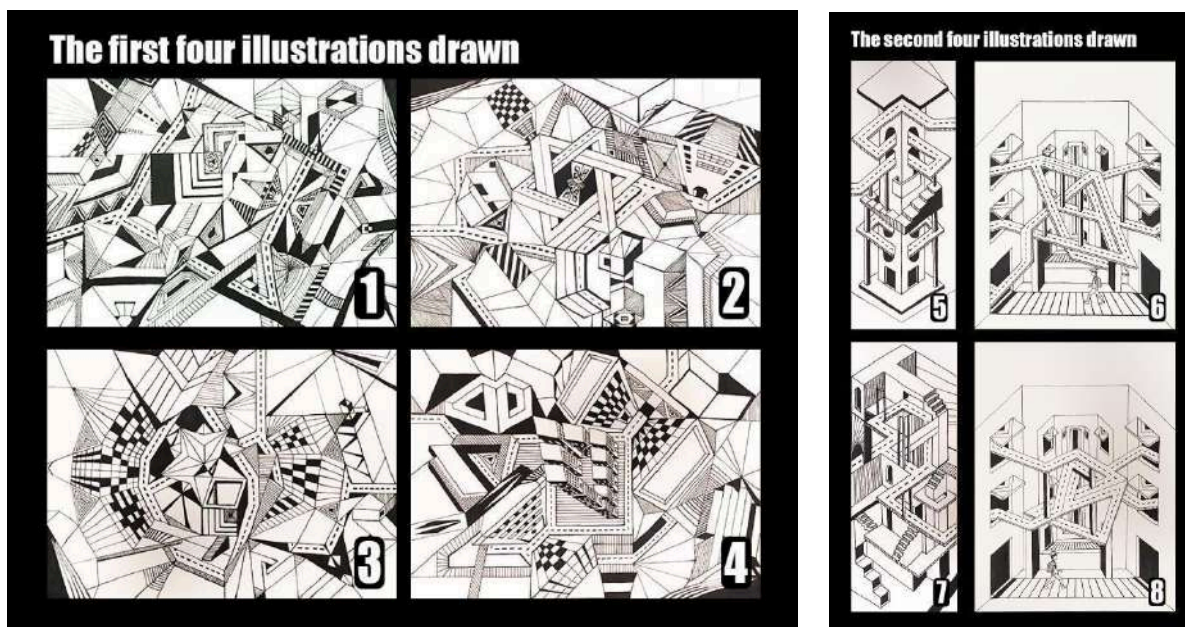


Figure 14. The First and Second Four Illustrations Drawn
(Source: Created and captured by the author)

The four illustrations presented in **Figure 14** (right-side) serve as the connecting component of the image, fusing the creative concepts of Monument Valley and Escher's contradictory space. They consist of four regular contradictory space pictures that link these five thematic paintings. The road and staircase in the image are inspired by Escher's Rising and Falling and Waterfall elements. The composition principle of the Penrose Triangle is utilised to deform the picture elements, ultimately incorporating light and dark variations into the image.

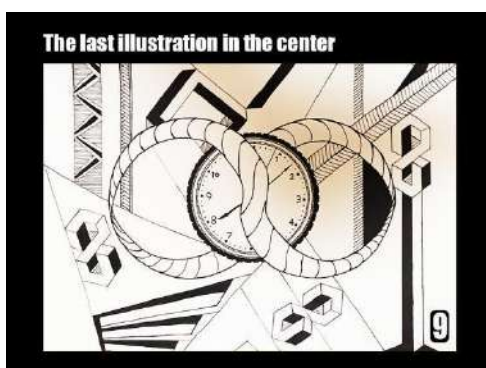


Figure 15. The Last Illustration in the Center
(Source: Created and captured by the author)

The illustrations presented in **Figure 15** serve as the core of the entire painting. This final drawing is considered crucial as it needs to connect with the remaining eight works. The image primarily features the Mobius Strip, with clocks and the symbol ∞ added to reflect the theme of infinite cycles. After the picture is stitched together, additional lines and faces are drawn to harmonise with the rest of the eight works.

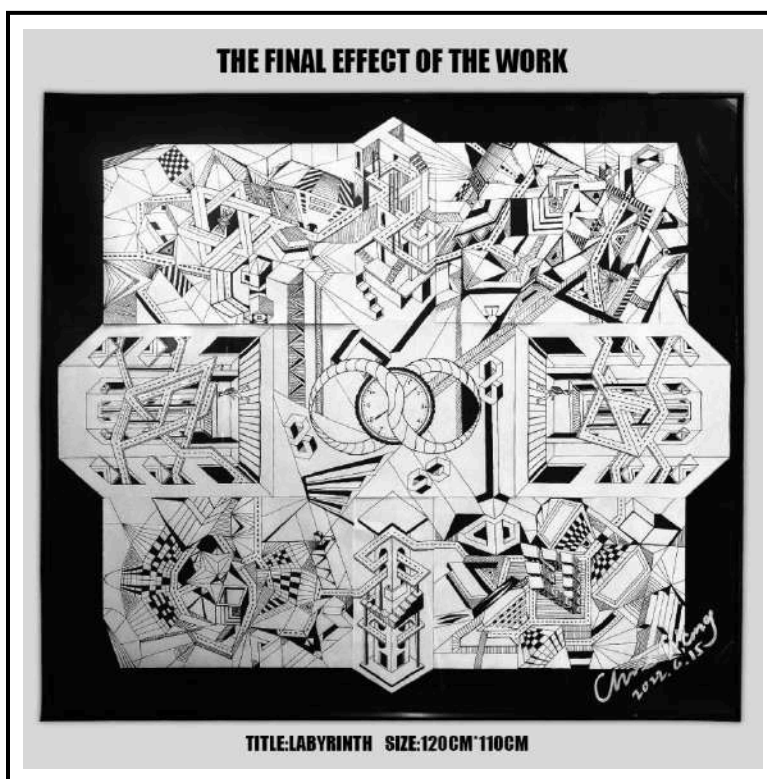


Figure 16. The Final Creative Output
(Source: Created and captured by the author)

In summary, as **Figure 16** shows, the entire painting is replete with numerous impossible shapes, and it also incorporates classic elements from Escher's work, such as *High and Low*, the Penrose Triangle distortion, the staircase in *Ascent and Descent*, the Riemann Surface distortion in the *Gallery*, and the intriguing three-dimensional shapes in *Monument Valley*. When combining these elements, some fundamental principles of contradictory space shaping are employed, including:

- Re-distorting impossible figures through extension and combination.
- Establishing different vanishing points for the image, enabling the picture to be contradictory.
- Utilising lines to partition the image, resulting in a contradictory appearance.
- Filling the picture with the sparsity of lines and colour blocks creates contradictions in the relationship between light and dark within the image.
- Using lines and faces to link different elements, forming distinct spaces.
- Blending classic elements from Escher's works with modern elements to achieve various picture effects.
- Combining impossible shapes with realistic perspective to create a logically contradictory space.

Through this creative process, it was learned that altering the perspective relationship of the image can be achieved by manipulating vanishing points and playing with spatial composition through the use of impossible graphic structures such as the Penrose Triangle and Möbius Strip. The focus and challenge of this creation practice lay in how to integrate various elements while maintaining the image's effect and order.

Combining graphic illustration with different elements and principles of contradictory space can produce diverse visual elements, realising various possibilities of the image (Bardi, 2015). As the image contains complex elements and varying principles of perspective, composition is particularly crucial in this creation. Integrating these diverse elements poses a challenge for the creative process. In this process,

the image can be enriched by extending, stitching, and filling colour blocks. By connecting different planes through lines and integrating various contradictory spatial elements in space, deforming impossible figures creates the subject of the image, while the abstract point-line surface composition outlines figurative objects. Moreover, the principle of perspective in contradictory spaces builds intricate spaces and creates suspense in the image, inviting the viewer's sense of perspective, stimulating their imagination, and providing a psychedelic visual experience.

The key attractions in illustration design are exceptional drawing skills, innovative new creative elements, and distinctive image presentation (Hirons & Brown, 2019). This also places higher demands on the designer, as sophisticated design necessitates breaking the aesthetic fatigue of images (Perold-Bull, 2020). Maintaining the overall effect of the image is a challenge, especially when the image size is large and there is a significant amount of content. This study suggests extending the image through a regular pattern of images. With various complex elements to be combined in the image, no more than three types of fill representing light and dark should be used. It is also essential to control the area of darkness in the image and combine it with easily identifiable images to enhance the image's order. The creation of innovative and interesting images that capture people's attention is vital.

The Opinion from the Viewers

Viewers provided numerous insights regarding this work. Two main themes were summarised in this study. Regarding the perception of the created graphic illustration, the majority of viewers found this work intriguing, indicating that this type of illustration is appealing to people and worthwhile exploring and developing further. The unusual sense of space mentioned by the viewers, the confusion yet regularity of the image, signifies that the work elicits a sense of visual illusion. Additionally, after viewing the piece, viewers made various associations and connections with concrete objects in reality, stimulated their imagination initially, and engaged in creative thinking during this process, which may potentially have a positive impact on innovation.

However, viewers' attention was still easily drawn to the figurative objects, a factor that merits attention. For the issues of the created graphic illustration, some viewers initially mentioned a lack of colour as a problem. Perhaps adding colour could enhance the visual impact of the image. Lastly, the emphasis on key elements requires reinforcing the sense of order in the picture, which could provide more comfortable viewing experiences for the audience.

Overall, viewers had mixed opinions about this graphic illustration work, but the overall result was successful, delivering a considerable visual impact to most people, creating a visual illusion, and interacting with the viewer. The researcher's objective in the creation stage was essentially achieved. However, certain aspects such as colour, key elements, and image order need to be considered in future practice.

IMPLICATIONS, LIMITATIONS AND RECOMMENDATIONS

This study delves into M.C. Escher's concept of contradictory space composition and its implications for modern illustration design. By analysing Escher's works, we identify the fundamental elements and principles of creating contradictory spaces, thereby offering valuable guidance and significance for contemporary illustration creation. The research showcases the application of creative practice to stimulate viewers' exploration, challenge traditional spatial perceptions, and encourage creative thinking. It examines the historical origins and influences of contradictory space painting, analysing its artistic creation method in terms of perspective relationship, space composition, and sense of direction. Furthermore, the study provides insights into expressing intriguing spaces using points, lines, surfaces, and textures in graphic illustration design, generating multiple vanishing points and impossible

graphics to establish a novel perspective. By investigating the effects of visual illusions and their principles, this research broadens the mind and maximises the breadth and depth of creative thinking, effectively conveying the message and inner meaning of the work. The findings can inspire future art creation and promote the innovation of modern illustration design, particularly in transcending the constraints of traditional concepts and fostering inclusive mindsets during the creative process.

The findings of this study reveal a significant interest in new expressions of contradictory space and an eagerness to explore this type of illustration. However, several limitations require attention: Firstly, the limited number of interviewees and insufficient saturation of content leave room for further exploration. Secondly, the study was conducted solely in the Chinese region, resulting in limited data comprehensiveness. Future consideration could be given to similar surveys abroad. Thirdly, the final creation of this study remains in black and white, without coloration or combination with actual products. Future research will explore the representation of colour in contradictory space by recreating the works in a colour-filled manner, further enhancing the significance of the research through the combination of works with actual products.

In response to the limitations of this study, several suggestions are provided for further research: Firstly, to explore specific approaches to the application of contradictory space elements and principles, more experts in the field of graphic illustration should be interviewed, while also reconsidering and reinterpreting the meanings and methods in Escher's works to form a systematic study and complement existing theories. Secondly, technological methods such as eye tracking should be incorporated to study viewer attention, enhancing the research data's rigour. Thirdly, this kind of research should be extended to more countries and regions to collect data from diverse regions, evaluating people's perception of Escher's contradictory space works in different regions. Fourthly, research should be conducted on the application of colour in contradictory space works, exploring the specific use of colour in shaping these works. Lastly, combining the works with more actual products and exploring how to apply contradictory space concepts to real life will further enrich the significance of this research.

CONCLUSION

Through the study, the researcher can have a more comprehensive understanding of Escher's concept of contradictory space composition. This study collected some information about Escher and conducted a survey on the public's perception of this type of artwork, which could provide some reference value for evaluating or creating such works in the future.

The researcher presented the artwork to the viewers and conducted interviews. Previous research mainly focused on the specific analysis of single elements. This study provides some data on the perception of works, which could provide some reference for future research.

The researcher found that the most essential method of creating illustrations using contradictory space is to break people's general perception, which includes the relationship between perspectives, directions, light, and dark. The basic principle of contradictory space is to change the vanishing point of the picture through points, lines, and surfaces, combining impossible figures such as the Penrose Triangle and Mobius Strip to form a new space, using common-sense symbols to guide people's direction. The design of multiple vanishing points in the picture changes the inherent perspective, confuses the relationship between object faces using light and dark, and adds common-sense symbols that guide people's sense of direction. In order to quickly attract the viewer's attention, the image must be given an interactive function, allowing the content and the viewer to interact, thereby increasing the viewer's desire to explore and fully capture the viewer's attention.

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Virtual Skin Outfit in PUBG Mobile Games: Value and Enjoyment with Virtual Appearance

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ABSTRACT

Playing games is indisputably one of the most prevalent human activities. Without a doubt, the expansion of mobile gaming is undeniable. PlayerUnknown's Battle Royale is an exceptionally notable mobile game since 2018. Player Unknown's Battlegrounds (PUBG) has gained worldwide success, attributed to the charming gameplay, tactical component, and "Royale Pass" system, which provides in-game items such as virtual skins. A virtual skin is an in-game item that players may purchase and obtain in-game. These skins have different values according to their rarity. Gamers eagerly anticipate the release of their "Royale Pass" to discover the latest skin variations that cater to their preferences. Previous studies have raised concerns about these gambling-like properties due to the unpredictable and rare opportunities to obtain virtual skins, leading to ambiguity about players' perceptions of the value and enjoyment of these skins. This research aims to explore players' perceptions of the value and enjoyment of virtual skin outfits in the game. A survey was conducted via a questionnaire generated using Google Forms. The research employed convenience sampling as it was based on the accessibility and willingness of the respondents to participate. A total of 30 respondents responded to the question, and a descriptive analysis was performed using the Statistical Package for the Social Sciences (SPSS) to determine the frequencies of the variables indicated. The study's findings indicate that players attribute value to virtual skins due to their design and

style of the skin. Thus, they derive enjoyment from using the skins during gameplay. Moreover, the player's enjoyment in the game is influenced by their imagination and emotions, as they find various designs and styles aesthetically pleasing. Each player has their own unique perspective on beauty, and they have the freedom to select any virtual skin that brings them satisfaction in the game.

Keywords: *Virtual skin outfit, PUBG mobile game, Enjoyment, Value.*

INTRODUCTION

The video game industry is rising tremendously. According to The Asean Post, it is forecasted that the global game market will be worth US\$159 billion in 2020, and the figure is four times the office revenue in 2019, which is US\$43 billion. The Asia-Pacific region has the highest market revenue, accounting for nearly half the total game market value (Athira, 2020). The game industry is predicted to grow steadily, and one factor that could be the factor is the recent pandemic. The deadly virus, COVID-19, has threatened billions of lives worldwide, allowing consumers to spend more time playing games because of the stay-at-home phase. The pandemic shows increased gaming activity in the first half of 2020. This is part of escapism and a way to fill the time while in the quarantine phase. The lockdown situation allows these gamers to socialise and interact in games.

Mobile phones are the most popular platform for gamers to indulge in their favourite pastimes. Young adults and teenagers are attracted to the addictive nature of mobile games, and in certain situations, even older individuals. According to Newzoo's Global Games Market Report 2020, most players will access the ecosystem via mobile devices by the end of 2020. This platform's easy gameplay, shorter wait times, and advertising-based revenue make it possible for anybody to play and enjoy (Newzoo, 2020). The mobile gaming market for smartphones and tablets will be worth \$77.2 billion in 2020, a growth of 13.3 percent yearly. This is because most gamers have shifted from PC gaming to mobile gaming, which is decreasing with time. The second major factor contributing to the expansion of the worldwide gaming business is the lockout scenario of COVID-19 (Newzoo, 2020). One of the most famous downloadable mobile games is PlayerUnknown's Battlegrounds (PUBG). This game has been played worldwide. The first version was released in 2017 and has since received the Best Multiplayer Game award in 2017 and the Best Mobile Game award in 2018, both at the Game Awards (Gough, 2020). PUBG is one of the top mobile e-sports in 2020, and the PUBG Mobile Club Open Fall Split Global Finals in Kuala Lumpur has attracted massive audiences, with contestants from over 20 nations and a \$476,400 prize pool. (Conlan, 2020). Its reputation also increased when PUBG entered the South East Asia (SEA) Games in Vietnam in May 2022. PUBG is currently a viral game with 100 players, and the catchphrase is "Winner, Winner, Chicken Dinner." Both esports pros and amateur gamers play the game from across the world. Similar games include Fortnite, Call of Duty, and Free Fire, in addition to PUBG. Nevertheless, based on the early research, this study will examine the most recently played game by respondents, which is PUBG.

The rise in popularity of PlayerUnknown's Battle Royale since 2018 highlights the increasing impact of mobile gaming. The reference to the "Royale Pass" and the excitement it elicits among players underscores the significance of virtual skins in the gaming community. The inclusion of virtual items that may be acquired with digital currency enhances the game experience by introducing an intriguing dimension. Virtual skins are virtual items in-game that can be bought from a loot box, royale pass, events, or as a seasonal reward to the players. According to Grove and his view on the skin definition: "The term "skin" is derived from the typical function of these virtual items, changing the appearance of a player's in-game avatar, weapons, or equipment." (Grove, 2016). Grove was referring to Counter-Strike: Global Offensive (CS: GO), where skins are virtual items used in games, and they are purely aesthetic and do not add any function to the specific weapon or other item. In PUBG, an outfit is considered a skin. There are also weapon skins and vehicle skins. As previously stated, some skins are only available as part of a complete set during a specific event. At this point, skin becomes a collectable item for gamers. In some games, such as Mobile Legend Bang Bang, a skin is functional with specific attributes. However, in

PUBG, the skin is just an outfit with only aesthetic value. Gamers are waiting for a new event to buy a skin set and are willing to spend real cash, although they are expensive. PUBG virtual items are categorised by rareness level: rare, epic, legendary, and mythic. These items are placed in specific crates, with some crates having limited-time offers based on the event.

A thorough investigation of popular games such as Fortnite, Counter-Strike: Global Offensive (CS: GO), Dota 2, Call of Duty, League of Legends, and PUBG contributes to the growing study of virtual skin costumes. Researchers have explored several gaming settings to comprehend the complex influence of virtual skins on player behaviour, game economics, and the overall gaming experience (Joseph, 2020; Li et al., 2020; Makryniotis, 2018; Marder et al., 2019; Musabirov et al., 2017; Stadtmann et al., 2020; Wang, 2021). Virtual skin influences player behaviour, fosters engagement, and enhances the overall gaming experience. Players exhibit a strong desire to acquire aesthetic items, contributing to increased immersion, personalisation, and attachment to their in-game avatars or items. The economic aspects of virtual skin economies, including spending patterns, market dynamics, and the real-world value of virtual items, have been explored. The in-game market for virtual skins has proven to be a lucrative aspect for game developers, generating substantial revenue through microtransactions (Hamari, 2015; Hamari and Keronen, 2016, 2017; Li et al., 2020; Macey & Hamari, 2019). The psychological impact of virtual skin ownership reveals how these items contribute to player identity, self-expression, and social interactions within gaming communities (Li et al., 2020; Rivandy and Adibayu, 2020). The desire for rare or exclusive virtual skins often drives players to invest time and money to obtain these items, showcasing the emotional and psychological value attached to cosmetic customisation (Wang, 2021). Ethical concerns have been highlighted, particularly in relation to the use of loot boxes for virtual skin distribution, raising questions about player fairness and consumer protection. The existing studies on virtual skin outfits highlight their intricate impact on player behaviour, game involvement, and economic dynamics (Korkeila & Hamari, 2020; Macey & Hamari, 2019).

Although there is a substantial amount of study on virtual skin outfits, there is still a significant lack of information about players' firsthand reviews of the value and enjoyment connected with these cosmetic items. Though earlier research has examined the economic and psychological aspects, there has been a noticeable lack of investigation into the subjective experiences of players, specifically regarding their aesthetic preferences on the value and enjoyment of virtual skin outfits. The objective of this research is to fill this void by examining the intricate elements of player involvement with virtual skin outfits, resulting in a more extensive comprehension beyond mere expenditure patterns or broad psychological variables. The results of this study are positioned to provide useful insights into both academics and game production strategies, enhancing understanding of player preferences in the field of virtual goods.

LITERATURE REVIEW

Virtual Skin Outfit in PUBG

The habit of Malaysian PUBG streamers spending virtual currency in the game's loot boxes to acquire the skin outfit they prefer can be seen, and several videos document this behaviour. Unquestionably, purchasing virtual products in an online game is an issue. Numerous studies have been conducted on buying behaviour. The aesthetic value of virtual products is one of the aspects related to the purchasing factor. The most popular items are weapons, items, pets, mounts, and skin customisations (Cleghorn & Griffiths, 2015). Skins are based on a specific theme designed and come with a complete set. Therefore, gamers who considered to collect skins as their collectable item will insistently buy a loot box only to get the skin set. In PUBG, the skin will be applied to a particular item, such as an outfit, weapon, vehicle, and the best melee weapon, which is a pan. The unique skin set can be bought at a limited-time event. It should be noted that the skins are only for aesthetic purposes and have no special attributes or effects in-game. However, gamers still think that this purely aesthetic object is valuable and has some enjoyment to be used in games, though it does not affect gameplay.

Martinelli stated that skins are regarded as valuable by gamers: "Skins are merely ornamental and have no effect on actual gameplay, but have become a token of status and are immensely valuable" (Martinelli, 2017). Since skins in PUBG are aesthetic virtual items, they do not affect the gameplay. It has no unique functional elements to activate and no superficial powers to release when a certain skin type is used. Virtual items, which are purely aesthetic, have different values that the players determine. These products not only possess visual appeal but also impart status based on their rarity and contribute to the formation of one's identity or group affiliation (Martínez, 2017). Hellsten (2019) asserts that, like luxury apparel, aesthetic virtual items must possess substantial value to rationalise their purchasing by gamers. According to him, as games continue to improve in visual appeal, the first impression one gets of other players or gamers is mainly based on how they look.

Perceived Valuable and Perceived Enjoyment

A research was conducted to examine the purchase behaviour of aesthetic products, specifically focusing on how players of Counter Strike: Global Offensive (CSGO) view the value of these items. The study used the Consumer Culture Theory and narrowed its focus to the emotional and social components of commodity consumption. This study also examines the significance of symbolic consumption in order to understand the motivations behind players' purchases of virtual items. Martínez (2017), in his research, created a framework that focuses on three main perspectives on consumer culture identified by Featherstone (1990). Consumer culture theory focuses on three perspectives: 1) the expansion of capitalist commodity production, which has led to a vast accumulation of material culture; 2) the sociological focus on how people use goods to create social bonds or distinctions; and 3) the emotional pleasures of consumption, which generate excitement and aesthetic pleasure. The findings indicate a deviation from the motives often reported in players of free-to-play (F2P) and social network games. In these games, players generally obtain functional items to increase their enjoyment and reduce boredom while playing. Regarding Counter-Strike: Global Offensive, players have shown that they find pleasure in the game itself and do not consider virtual cosmetic items to be necessary for their in-game enjoyment. Instead, players purchase these items for hedonic and conspicuous consumption, fulfilling emotional and symbolic needs akin to owning a piece of art.

However, this is contrary to Manaf and Sabian's (2019) study about perceived visual enjoyment factors in artistic playability. They found that the visual aspect of the game did not significantly influence the player's engagement in continuous gameplay. Instead, the desire to finish the task and experience pleasure upon completion were the main motivating factors. However, the player expresses their subjective interpretation of the visual elements of the DOTA 2 game, highlighting their general satisfaction and admiration for the animation, crisp character graphics, realistic surroundings, and realism. The practical effect of the characters' powers encouraged players to extend the time of games, and the players are affected by visually rich effects during gaming. Additionally, a high-quality visual experience may significantly boost the player's excitement and motivation to play. This is supported by another study that examined the subjective perceptions of value associated with virtual goods and determined that the dimensions of value are socially built to varied extents in DOTA 2. The analysis shows that social factors influence and may vary the value of virtual items in various dimensions. The research specifically examines the internal structure of status and aesthetic qualities. The rarity and uniqueness of something determine its status, but its visual appeal is also a factor in its aesthetic appeal. Social behaviours like trading and interpersonal relationships have an impact on value formation. Understanding these aspects and their core elements has consequences for creating virtual items that match player preferences and improve the overall game experience (Musabirov et al., 2017). In addition, Gianto (2020) clarified the concept of perceived enjoyment in PUBG mobile games and found that the perception of enjoyment influences the desire to purchase virtual items, expressly signifying a desire to obtain items that are inside the game. This implies that the level of enjoyment is not just determined by the desire to play but also by the willingness to invest in or engage actively in the virtual gaming environment. Moreover, the persistent

desire to engage with the game, or a strong impulse to do so, has significant impacts on the intention to obtain virtual items.

According to Reza et al.'s (2019) study, "I Like the Way the Skin Looks," the desire for diversity in the virtual gaming environment is associated with the act of purchasing and using skins in video games. Specifically, players from ethnic minority backgrounds tend to purchase and use skins that reflect their racial and ethnic identities, indicating a strong preference for visual appeal and a desire for representation in the digital realm. A player highlighted the significance of representation, expressing a preference for content that profoundly engages them in the game and depicts characters that mirror the varied reality of the real world. This emphasises the significance of including a wide range of racial and ethnic representations of in-game characters to improve the gaming experience and demonstrate a dedication to diversity. This could indicate the probable relationship between self-expression and the player's need for self-attachment in the game.

All prior research studies had examined the perspective of gamers towards these virtual items, known as 'skins', in both direct and indirect ways. According to Martinez (2017), players' perception of the 'skins' in CSGO is connected to their desire to own a piece of artwork rather than being linked to their enjoyment of the game. However, Marder et al. (2019) and Gianto (2020) mentioned that purchases are driven by the need for enjoyment, which might be linked to the desire for new experiences or visual attractiveness inside the game. These factors included '*novelty*', '*aesthetics*', '*self-gratification*', and '*character dedication*'. Additionally, it may serve as a method of honouring achievements both inside and outside the game while also demonstrating devotion to a character within the game. Abdul Manaf and Sabian (2019), in their research, also mentioned that players were drawn to the visual elements of DOTA 2, such as its characters, but did not explicitly mention 'skins'. The enjoyment derived from playing, however, is closely tied to its realistic visual elements. Musabirov et al. (2017) and Reza et al. (2019) presented eye-catching representations that highlight the distinctiveness of 'skin' value. For instance, possessing items that are eye-catching and linked to high social standing might potentially damage the owner by drawing unwanted attention to their own behaviour or the behaviour of their teammates. This situation can be seen from an ethnographic study of emergent behaviour in PUBG on Steam by Aguilar (2019) which revealed that during the spawn phase, players express their personal styles and affinities within the gaming community. This observation impacts social interactions, cultivating a sense of belonging and unity among players with similar preferences for virtual skin '*themes*', '*colours*', and '*styles*'.

Virtual Skin and Player's Imagination

When we contemplate imagination, several things come to mind. Some individuals may associate imagination with creative thought. Within the context of players and virtual skin outfits, it is how we interpret a scenario or item in the virtual world that drives us to acquire it, even though it is intangible. The force of emotion on "I want to have this skin" might be a factor that grows the imagination of players of having a collection of bundle skin outfits in their virtual wardrobe. A desire that might lead to the satisfaction and enjoyment of having this beautiful collectable item. Koumoundouros mentioned that imagination is "Imagining something into reality is probably a desire as old as imagination itself, but there might just be a slight bit more to it than mere wishful thinking" (Koumoundouros, 2019). In real life, we have wishful thinking that leads us to dream and imagine something we want in the future. Thus, in PUBG, players desire those skin outfits that evoke their emotions. Hence, they will purchase the skin at whatever cost, either for their satisfaction or for them to show off to their peers. The selection of skin outfits in PUBG is like Outfit of The Day (OOTD) in the current trend term. Player's imagination when selecting what skin to wear might be related to their emotions. Their decision to choose a skin for the day is associated with the imaginative vision of their desired persona, what maps they will go on, what beautiful skin they want to show off to their friend, or perhaps, "I just use it because that is what I have". Players tend to change their skin and imagine that the skin represents them. The imagination could also be in a different way. A person might imagine that they can wear something different from what they are.

Players also tend to match their skin's outfit with their peers. This way, the skin gives them a feeling of being part of the team.

Though there is no direct effect on the gameplay when gamers use an aesthetic skin outfit, it cannot be denied that this virtual skin outfit gives some satisfaction to gamers when they use skins in playing games. Imagination is a fascinating skill of the human mind that affects our primary perception and comprehension of the environment in which we reside (Kiefer, 2020). A player uses their imagination to interact with the experience, not to describe it (Buchanan, 2016). Buchanan mentioned that the vibe of the impressive game is delivered from the game's creator's imagination to the player's imagination. In this case, the creation of a virtual skin set by the game's creator gives the players a chance to experience the imagination of the aesthetic virtual skin outfit. The selection of the skin outfits with the realistic representation of the game display gives the players a feeling of having a charming outfit in the real world. This includes the gender preference, either to use a male or female avatar. Players imagine and experience a virtual skin outfit to match the current maps in PUBG. According to pubg.gamepedia.com, PUBG has four different maps: Erangel, Sanhok, Miramar, and Vikendi. The latest map currently running in beta testing is Livia. All these maps have different environments and surroundings. Vikendi, for instance, is a snow forest map, and its location was inspired by the Adriatic Sea. Miramar is inspired by a desert in Mexico, while Sanhok is a rainforest/jungle environment taken from various islands in the Philippines and Thailand. Meanwhile, Erangel is a map inspired by the Russian climate with a forest theme (Maps, 2020). Because of the different weather and maps, players tend to visualise themselves in the surroundings and change their virtual skin outfits based on the map they will be playing. For example, a player might choose a white skin outfit for the Vikendi map or wear a warm and thick skin outfit just to fit in with the environment.

PUBG is currently in its "New Royale Pass A5" season, as mentioned on the official PUBG mobile website at <https://www.pubgmobile.com/en-US/royalepass.shtml>. Starting with season 4, a "Royale Pass" has been introduced in PUBG, which can be purchased using a virtual currency known as "Unknown Cash" (UC). This UC can be bought directly from an in-game application or other platforms that sell virtual money, for example, "midasbuy," which is an official account link to purchase virtual currency. "Royale Pass" gives players a chance to get skin by completing a mission and getting a free, rewarded skin outfit after buying a pass. From the Indian mobile gaming scene, besides supporting the developer, players buy "Royale Pass" to get top-quality loot. They will get an in-game item, though they must spend some money. Showing off is one of the reasons premium gamers buy "Royale Pass". Those who have money will buy it. This can be related to the collectors, who are willing to spend to fill their inventory with new skin from all seasons. The last factor that is also related is "the status seeker," which means if your peer has it, then you must have it (Biswas, 2019). This article relates to the social factor of how players act in-game regarding their behaviour when purchasing an in-game item. The purpose of buying and showing off the inventory that consists of skin is to give them some satisfaction.

Games allow players to control characters in imaginary environments, also enabling a high degree of flexibility at both visual and mechanical game levels (Harrell & Harrell, 2012). Added to this, there must be social, psychological, technological, cultural, and aesthetic factors at play that are worthy of inspection, given the broad distribution of user representations across platforms. In PUBG season 13, most of the adult players are not pleased with the 'Toy Playground' theme by the developer. The Power Rangers and Super Sentai skin are not preferable, and many complaints have been received. Several players have claimed that the design is similar to Fortnite, and the realistic image that was once associated with PUBG has been missing because of it (Eko Saputro et al., 2019). Adult players tend to like realistic skin rather than something that looks childish. Because the character and skin represent the player itself, the character needs to reflect themselves. The selection of skin and characters relates to a player. For example, in one study about personality and fantasy games, individual variations, such as age, sex, race, and personality, affect the selection of characters (Park & Henley, 2007). The study also indicates that males exhibited a preference for selecting human characters, while females tended to choose elves. Female gamers showed a more pronounced imagination compared to their male counterparts when comparing their preferences. Women often prefer options that diverge from reality. In PUBG, when

engaging in imaginative role-playing, male players often opt to select a female persona as their avatar. They either perceive themselves as female or have a strong admiration for ladies, which might be the reason that motivates them to select it. That will be a distinct issue to deliberate. However, this study has indirectly shown the differing perspectives of women and men on the value of virtual skin and their level of enjoyment with its use in games.

RESEARCH METHODOLOGY

This preliminary study used convenience sampling, a non-probability sampling technique that selects respondents based on their ease of access. The benefits of this method are its cost-efficiency, time effectiveness, and convenience (Etikan & Bala, 2017; Golzar, 2022). The surveys were sent to the respondents ($n = 30$) using Google Forms. Hinton et al. (2004) provide a recommended range of 10 to 30 respondents as an appropriate sample size for preliminary research. Prior to responding to the online questionnaire, a concise explanation was given of the objective of this survey, and respondents were instructed to offer feedback on the questionnaire. The questionnaire does not provide any visual representation. Instead, the rating relies only on the players' prior experience with the use of virtual skin outfits inside the game.

A descriptive analysis was performed using the Statistical Package for the Social Sciences (SPSS) to determine the frequencies of the variables indicated. Descriptive analysis is an essential component of statistical data analysis since it transforms unprocessed data into a format that is both comprehensible and interpretable. Data analysis encompasses the process of reorganising, sequencing, and altering data to uncover valuable insights. Descriptive analysis facilitates the constructive description of data points, enabling the identification of patterns that satisfy all data requirements. The tool offers a comprehensive analysis of data distribution, effectively recognises typos and outliers, and accurately determines similarities among variables, hence facilitating further statistical studies (Rawat, 2021). Descriptive analysis seeks to ascertain the occurrence rate of a particular event or reaction using metrics such as counts or percentages. For example, in a survey consisting of 500 participants, tracking the frequency of selection for a specific IPL team might enhance data accessibility by minimising the number of necessary replies (Rawat, 2021). This research used frequency measurement to analyse the data further. This approach is relevant to the goal of exploring the player's perception of the suggested variable.

The suggested variable is "*Perceived Valuable*," which encompasses design and style, collectability of cool items, the functionality of the skin, camouflage, novelty, and self-reward. "*Perceived Enjoyment*" includes satisfaction in the gameplay, attachment to the character, social self-image expression, emotional, symbolic, and hedonic needs, and 'showing off.' The frequency technique would be used to figure out the players' preferences for each item in the variables. This will include constructing a percentage to indicate which item is favoured by the players in terms of its value and enjoyment derived from its visually appealing appearance.

Instruments

The questionnaire took about 5 to 6 minutes to complete and has three sections – Part A: Respondent's details, Part B: User behaviour on the game, and virtual skin.

The purpose of the self-structured questionnaire is to explore players' perceptions of the value and enjoyment derived from virtual skin outfits in the game. The variables are derived from an in-depth review of the literature on virtual items and consumer behaviour pertaining to the purchase of virtual goods in games. The survey includes five multiple-choice options and open-ended questions where respondents may express their own opinions about the utility and fun of utilising in-game skins.

Nevertheless, the open-ended question received a response from just one participant, and this response is included in the data for the "perceived value" variable.

Respondents

A total of 30 respondents participated in the study (Table 1), with an equal number of males and females. Of the 30 participants, 22 of them (73.3%) come from the age group 18 – 24, while 7 of them (23.3%) come from the age group 25 – 34. Only one respondent is from the age group 35 – 44, which makes up the rest of the sample (3.3%). The employment status shows that 21 of them (70%) are students, 7 of them are working (23.3%) and 2 of them are unemployed (6.7%).

Table 1. Respondents' demographic

Independent Variables	N (%)
Gender: <i>Male</i> <i>Female</i>	15 (50%) 15 (50%)
Ager: <i>18 -24</i> <i>25 – 34</i> <i>35 - 44</i>	22 (73.3%) 7 (23.3%) 1 (3.3%)
Employment Status <i>Students</i> <i>Unemployed</i> <i>Working</i>	21 (70%) 2 (6.7%) 7 (23.3%)

FINDINGS

The frequency table shows male and female respondents how they perceive skin as valuable to them (Table 2). The players had chosen these six elements, which they mentally assigned these meanings to the skin they purchased or used. In those six, one element is an open-ended answer from a respondent, which is self-reward. The five elements are camouflage, design and style, collectability, cool item, functionality, and novelty. The frequency showed how frequently males and females select the elements they value the most. The overall result shows that design and style are the most frequently answered, with 93.3% ($n = 28$). Almost all agreed with this element, and both males and females are equal in number, which is 14. This was followed by 'collectability cool item' - 70% ($n = 21$). This element shows that males are more likely to collect skin than female respondents, with 12 males versus 9 females. A total of 16 players felt that they benefited from the functionality of the skin (53.3%), constituting nine (9) female players and seven (7) males. Camouflage constitutes 23.3% ($n = 7$). Four male respondents agreed that skin can contribute to camouflage, while only three females agreed. Novelty is only 16.7% ($n = 5$), and females are more particular about novelty than males ($n = 2$). There is one open-ended answer that comes from a male respondent, which is self-reward with 3.3% ($n = 1$).

Table 2. Perceived valuable frequency of virtual skin

Elements	Male	Female	N (%)
Design and Style	14	14	28 (93.3%)
Collectability cool item	12	9	21 (70%)
Functionality of the skin	7	9	16 (53.3%)

Camouflage	4	3	7 (23.3%)
Novelty	2	3	5 (16.7%)
Self-reward	1	0	1 (3.3%)

The frequency table above shows males' and females' perceived enjoyment of using virtual skin in-game (Table 3). 'Satisfaction with the gameplay' is the most frequently answered question by respondents, with 83.3% ($n = 25$). There are 13 males and 12 females that support this statement. 73.3% ($n = 22$) said they were an attachment to the character, with 11 males and 11 females. 11 male and 10 female players stated that the skin is for social self-image expression, which accounts for 70% ($n = 21$). Then, for emotional, symbolic, and hedonic needs (53.3%; $n = 16$), more than half agreed to this, with an equal number of males and females, which is 8. Meanwhile, 'showing off' is at the bottom and less favourable with 36.7% ($n = 11$).

Table 3. Perceived enjoyment frequency of using virtual skin

Elements	Male	Female	N (%)
Satisfaction with the gameplay	13	12	25 (83.3%)
Attachment to character			
Social self-image expression	11	11	22 (77.3%)
Emotional, symbolic, and hedonic needs	11	10	21 (70%)
Show off	8	8	16 (53.3%)
	7	4	1 (36.7%)

DISCUSSIONS

This study examines players' views on virtual skins' value and enjoyment. Males and females see virtual skin differently; hence, element frequency was investigated by gender. Both sexes appreciate value in design and style, as well as enjoyment and satisfaction from in-game play on virtual skin. Males are more likely to display virtual skin as a collectable item because they value it more than females because they are more likely to flaunt it in-game. Skin function is more important for females. Given its distinctive appearance and style, skin design is an enjoyable and valuable in-game item. Both males and females prioritise skin design and style, followed by seasonal and functional skins. Virtual skins provide players with a virtual environment and significance. The design's rarity enables players to use their creativity and appreciate their look as an in-game valuable asset.

PUBG skin outfits are valued depending on imagination and expectation. excitement that may satisfy their beauty demands and desire for an aesthetic virtual good. After trying various seasonal, beautiful virtual skin outfits, the player's creativity grows stronger. Design and style matter most to players, and this analysis implies that rare skin-design outfits will grow in value because of players' attractiveness to them. This rarity sometimes makes the player different from the crowd and allows players to stand out or show their team loyalty (Wolfarth, 2019). Each season, players may earn a free skin to use as peer-group identification. Players dream about their seasonal skin designs, and collectors should have them. An aesthetic virtual skin outfit is not functional; however, some players believe it has a disguise purpose, such as utilising a white skin outfit to win Vikendi maps. Since it's aesthetically pleasing, it doesn't alter the skin's outfit's functioning. The camouflage factor is a result of the player's imagination and indirectly makes the appealing virtual skin outfits useful. Since novelty placed second in recognising virtual skin as valuable, respondents either didn't understand it or neglected to factor it in. The value of the virtual skin outfit differs based on player preferences; for example, in PUBG season 13, the developer came up with a very fancy toy box theme that is possibly appealing to teenagers but not to adults.

The character with a virtual skin outfit functions as the player's avatar. An avatar is a player's social representation, a graphical depiction of the character they control (Rogers, 2017). Thus, a player's selection is strongly influenced by their emotions and ideas about what they enjoy and desire to be. The expression of a player's social self-image in PUBG depends on the skin they chose for their avatar to represent themselves. It provides a sense of attachment to the character. In-game identification is influenced by the player's relationship to the character and their gameplay experience (Sommer, 2016). Hence, a player in PUBG feels connected to the character through the skin outfit they use in-game. So, this is the main thing that makes players enjoy the game when they have "skin in the game." Though the result (Table 3) shows that showing off is the lowest element to provide enjoyment in using virtual skins in-game, it has some significance to some players. Previous research highlights the importance of a virtual skin outfit in a player's community, as it reflects their community status and appreciation of the skin. Owning rare and expensive skins, such as rare and expensive skins, is seen as a symbol of community status and appreciation. The aesthetic aspect of a virtual skin outfit is strongly linked to showing off among the community rather than the functional aspect (Hamari, 2015; Hellsten, 2019; Wolfarth, 2019). The emotional, symbolic, and hedonistic demands of a virtual skin are interconnected with how players feel. Both males and females agree that virtual skin has different symbolic and hedonistic meanings, but more research is needed to understand the deeper meaning behind these meanings.

CONCLUSION

Building upon this research on the perceived value and enjoyment of virtual clothing items in PUBG, the following suggestions aim to continually provide unique virtual outfits that appeal to players' interests. In addition, recommendations for improving the system that determines the probability of a player obtaining a virtual skin outfit include mechanisms to reduce the risk of developing an addiction to in-app purchases. Game makers should offer a *'diverse range of virtual skin outfit designs'* to cater to various user preferences. This ensures gamers can showcase their uniqueness in the digital realm. *'Community engagement'* can be fostered through online skin design competitions and live event skin design competitions. Incorporating player feedback into the creation of virtual skin outfits can enhance satisfaction and community involvement. *'Wide-ranging depictions'* of ethnic origins, genders, and fashions can enhance the welcoming atmosphere in gaming. *'Customisation and personalization'*, can be achieved through various colour selections or brief events designed to customise avatars. *'Continuous innovation'* in technology and industry developments can further enhance the gaming experience by integrating AR functionalities and dynamic animations. Overall, incorporating diverse designs and user preferences can enhance the gaming experience for gamers.

Royale Pass, a popular virtual skins outfit, is a popular choice among a diverse range of players. To ensure *'fairness and accessibility'*, it is recommended to implement fair procedures that don't limit access based on financial capacity. The *'integration of functional skins'* can enhance gameplay while maintaining balance, such as adding unique animations or effects. *'Transparency in rarity systems'* is crucial for managing player expectations and fostering trust in the virtual economy. However, current rarity probabilities may result in players spending a significant amount before obtaining valuable items. *'Advocacy for prudent expenditure'* includes features promoting responsible spending on virtual goods, such as imposing fiscal limits, providing notifications for excessive spending, and providing educational materials. *'Collaborative events'* can foster engagement with the gaming community by creating unique challenges and providing players with special skins as incentives. These strategies aim to promote a dynamic gaming experience and unity within the game.

In summary, the comprehensive implementation of these suggestions and recommendations is poised to transform the gaming experience by fostering creativity, inclusivity, fairness, trust, and responsible gaming habits. The result is a gaming atmosphere where players feel empowered, connected, and excited about the virtual worlds they inhabit, mainly using diverse and engaging virtual skin outfits.

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Collaborative Innovation of Handicraft Intangible Cultural Heritage and Cultural Creative Design: Ningxia Yanchi Handmade Carpet

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ABSTRACT

Ningxia Yanchi handmade carpets have a history of more than 300 years. They are one of the important handicrafts intangible cultural heritages (ICH) in China, similar to other handicrafts, facing the challenge of disconnecting from daily life. Cultural and creative development, as an important non-inheritable approach, has played a significant role in the modernisation and branding of various arts and crafts. The purpose of this study is to analyse the technological process and creation mode of Ningxia Yanchi handmade carpets on the basis of the theory of design affairology, and to propose a new optimal design framework. Based on the theory of design transactions, establish the "thing" logic in the creation of Yanchi handmade carpets and extract "elements". By transitioning from "thing" to "elements" in terms of graphical structure and colours, the individual pattern elements with modern aesthetics are organised. Based on the theoretical research foundation of Design Doctrine, cultural and creative design has the characteristics of clear thematic expression and coherent structure, which not only satisfies people's daily needs through traditional forms but also promotes the revival of traditional Chinese craftsmanship. It can serve as a new path for the innovation and development of traditional techniques. From a practical perspective, design affairology combines traditional skills of Intangible Cultural Heritage (ICH) with cultural creative design, creating new avenues for research and development of ICH-related designs. At the same time, the modernisation of ICH products through cultural and creative design is just one approach to heritage preservation and protection, expanding the scope of theoretical research.

Keywords: *Cultural, Design Affairology, Heritage, Handicraft, Intangible*

INTRODUCTION

The protective development of Yanchi handmade carpets, similar to other handicrafts, faces the challenge of disconnection from daily life. Cultural and creative design helps integrate handicrafts into modern life. Handicraft Intangible Cultural Heritage (ICH) represents a living artisan culture (Yang, 2020). In 2021, Ningxia handmade carpet weaving techniques were included in the national ICH representative project list under the category of traditional skills (Ningxia handmade carpets, 2023, para. 3, n.d. Ningxia Hui Autonomous Region Rural Revitalization Bureau). As of June 2023, 43 projects from China have been included in the UNESCO Intangible Cultural Heritage List (43 Items from China Included in UNESCO Intangible Cultural Heritage List_Tencent News, n.d.). Although many handicrafts have been included in the ICH list, it does not necessarily mean they are well protected. In contrast, some artisans practising these handicraft skills are often seen as disconnected from modern society and people's daily lives (Greru & Kalkreuter, 2017; Li et al., 2019). Some traditional craftsmen have relatively low comprehensive qualities, and the development of traditional handicraft products they create neither actively inherits traditional culture nor meets the development needs of modern society, which has had a certain impact on the overall development of traditional handicrafts (Li et al., 2019). As a result, many local craftsmen struggle to make a decent living and face issues such as low brand visibility, confusing product positioning, and unattractive derivative product development (Wan Nor Jazmina et al., 2023). The collaborative development of Intangible Cultural Heritage (ICH) and cultural creative design is based on the elements of ICH to develop and produce cultural creative designs that are mainstream in modern products such as daily necessities and stationery. The shapes used may include one or multiple elements of ICH but are not limited to traditional craft shapes and can be produced on a large scale using modern methods. Essentially, these products add value to cultural and commercial exchange. In terms of cultural creative design, people can not only adopt various modern design techniques and typical elements of ICH but also interact with inheritors of ICH or traditional craft masters. This form enhances the cultural experience of cultural creative design, adds additional value to cultural creative design, and better integrates ICH into modern life.

LITERATURE REVIEW

Sustainability of handicraft ICH

Cultural heritage can be divided into tangible cultural heritage and intangible cultural heritage according to the form of information. Intangible cultural heritage refers to non-physical but not limited to performances, cultural knowledge, professional ability, etc. Passed from generation to generation, these skills are now possessed by a few master crafts persons (Rozita et al., 2023). Intangible cultural heritage refers to the main forms of some traditional material civilization themed activities and forms that exist in designated intangible forms and are in direct contact with everyone's daily life at that time (Xiao, 2022).

Regarding the sustainable development of ICH, some scholars believe that the information age has created opportunities for ICH to create new art forms, and ICH should innovate and develop. For example, the creativity and expression of traditional and non-traditional arts and crafts has gained unprecedented space, and a large number of new art forms have been created (Hammou et al., 2020). As an intangible cultural heritage, arts and crafts should be inherited actively and innovatively, the craft heritage has the potential to generate income while guaranteeing the sustainability of this cultural heritage (Wan Nor Jazmina et al., 2023). From the perspective of the development gap of ICH, some scholars believe that many ICH products have two sustainability problems. One is the shrinking of the core practitioner group, and the other is the extremely low added value of the product. There are some ICH products that have undergone little adaptive innovation to meet the functional or aesthetic needs of modern society (Curkovic, 2021).

From 2016 to 2022, many scholars mentioned in their articles that ICH combines the development of cultural and creative products. For example, Fu (2016) believes that China's unique and colourful intangible cultural heritage has laid a solid material foundation for the cultural and creative industries, and these are inexhaustible sources of creativity. Deng et al. (2020) also expressed his opinion in the article that combining ICH with cultural and creative products can not only increase the added value of products, but also broaden the cultural value of ICH. Summarising the views of these scholars, this researcher believes that in the coordinated development of intangible cultural heritage and cultural and creative design, it is necessary to maintain its own characteristics. Cultural creation cannot be done for the sake of cultural creation, nor can it be done for the sake of intangible cultural heritage. Only when they complement each other can their characteristics be brought into full play. For example, the successful sales of Cultural innovation in the Palace Museum, although not replicable, also shows the great potential of ICH + cultural and creative works. Generally speaking, the current ICH cultural and creative design has not formed an independent and complete system for industrialization.

As far as Ningxia is concerned, most ICHs lack professional cultural and creative R&D centres and creative teams and focus on entrusted design and market procurement. The most prominent problem is that the combination of product creativity and intangible cultural heritage is not ideal. In his article, Li (2019) analysed the problems encountered in the development of ICH in Ningxia. He believed that the earliest production of most traditional crafts originated from the practicality of production and life, such as sachets, pillowcases, rolling felt, sheepskin rafts, etc. These things used to be essential daily necessities in people's lives, but now they can no longer meet the needs of modern life (Li, 2019). In addition, the researchers of this article found some problems from the design point of view. One is that some cultural creations are too direct in using intangible cultural heritage elements, simply piled up indiscriminately, resulting in a complicated appearance but a monotonous cultural core. The second is that the varieties of cultural and creative products are similar, lack individuality, and have not formed an IP image that is out of the circle. The third is that the packaging of cultural and creative products is not exquisite, and there are problems such as lack of brand awareness.

For the coordinated development of ICH and cultural innovation, many scholars also believe that designers should be involved. Based on scientific design methods, the sustainable development of ICH products can lead to a virtuous circle. For traditional craftsmen, they have in-depth research on intangible cultural heritage, but lack experience in cultural and creative development. Designers have certain design experience, but most of them lack in-depth research on intangible cultural heritage. The two cooperative innovations can complement each other, and can realise the development model of joint learning and cooperative development between inheritors and designers (Yang et al., 2019; Wang, 2021). Under the guidance of user innovation theory, Sun and Liu (2022) studied bamboo weaving design technology and developed a series of auxiliary tools for automatic drawing. This technology helps designers quickly design and express weaving structures with complete details, which helps to create a sustainable technological research ecological environment, and also avoids the difficulty of attracting commercial investment in the initial stage of such niche needs (Sun & Liu, 2022, p. 5). Practice has proved that in many intangible cultural heritage industries, the design concept of designers serves ICH products, which can improve design efficiency and make products easier to be accepted, which is also a consensus gradually formed in the design community.

Design Affairology

In China, the inheritance spirit of many intangible cultural heritage traditional handicrafts follows the product of the ancient creation aesthetic thought. In the ancient creation activities of our country, the Confucian school Xunzi put forward the idea of "Heavy personal servitude", It refers to people themselves as the main body, and objects are used by people. Taoism advocated "Unity of Heaven and Man", It is believed that man, nature and the universe are a whole, man is a part of it, and man's behaviour and consciousness should be in harmony with this whole. The Song Dynasty Neo Confucianism advocates "study the nature of things", It means to view things, we must explore the essence (root) of

things in order to obtain the truth. The ancient people's creation design behaviour is also to create "things" for "element", which must conform to the laws of nature, rationally use the properties of materials and implement craftsmanship (Wu, 2022). The ancients emphasised that people should give full play to their leading ideas, and talents are the fundamental factor, which is the essence of design "people-oriented". This idea is also the same as the core of Design Affairology, which is "seek truth from facts".

In the 1990s, the methodology of Affairology took shape. In China, in 1985, Professor Liu Guanzhong of Tsinghua University first proposed Design Affairology. After 2008, design affairs has been widely used as a research and design method to guide specific design practices (Wang, 2019). Design affairology is widely used in design activities such as product design, graphic design, space design, automobile design, packaging design, service design and service system model design. Liu (2006) believes that design should be the design of "Elements" (事), rather than the design of "Things" (物). "Element" is not the same thing as "Tings". "Element" refers to people's understanding, change and utilisation of things, and "Things" refers to what is commonly referred to as material, real objects, etc., just like food is a thing, eating is a thing (Liu, 2019). To sum up the point of view of design affairology, if we only design "things", the design will only stay on the surface, which is an illusory vanity, not the essence of design.

From the perspective of design affairs methodology, for ICH cultural and creative design to be integrated into modern life, it must meet the aesthetic needs of the modern public and the value needs of current cultural and creative products. The system can be constructed from the three elements of "things", "element" and "people", to carry out modern transformation. That is: intangible cultural heritage elements (element)—expression carrier (things)—art and utility (things)—contemporary life (people). Put the result of the design into the specific "thing", and check whether it is reasonable and fair in the process of doing things, and see whether the design of ICH can better integrate into modern life. In his research, Wang (2019) introduced design affairology into the design research of Xiaoyu Bamboo Utensils, systematically analysed the internal and external influencing factors of Xiaoyu Bamboo Utensils, and explored the contemporary applicability of Xiaoyu Bamboo Utensils (Wang, 2019). Using design affairs, Wu (2022) takes the design of lacquer art products as an example, emphasising that designers should transform from design "element" to design "thing", then meet the needs of people, so that "old technology and old materials" can serve modern life (Wu, 2022).

"Element" refers to the intangible cultural heritage element itself; "things" refers to a specific condition (such as time limitation, space limitation, behaviour limitation, etc.) people and elements or people and people directly produce scenarios, interact behaviours, and exchange information. Because of this, people have experiences and feelings, and the element has also changed, resulting in the so-called "meaning" of things. For example, Liu (2006) said, "What we design and create is not actually "seat" (element-noun), but "sitting" (behavioural things-verb)." The traditional view is that what we design and create is a tangible "element", However, what is more important is the mutual relationship between people and elements, that is, "things" (Liu, 2006).

Ningxia Yanchi handmade carpet

The notice of the People's Government of Ningxia Hui Autonomous Region on publishing the first batch of representative list of ICH at the autonomous region level (Ningxia Government, Document No. 91, 2007) released a total of 33 district-level ICH lists. Ningxia Yanchi handmade carpet production has already been listed in the traditional textile handicrafts. The source of Chinese carpets is located in Xinjiang, and gradually spread to several provinces in the Northwest through the Silk Road and the Hexi Corridor, especially Gansu, Ningxia, Inner Mongolia and other places. Ningxia carpers have been developed for more than 300 years, and it is widely regarded as one of the best handmade carpets in China at that time. Ningxia is irrigated by the Yellow River and flows out of the Ningxia Plain. It has become one of the prosperous places on the "Silk Road " and has a variety of cultural histories. Historically, the Dangxiang ethnic group that once established a dynasty in the Ningxia Plain, invented

writing, and lived and multiplied, from prosperity to extinction, gradually transformed the Ningxia Plain from a pure nomadic economy to a semi-agricultural and semi-pastoral economic type, and the nomadic culture has thus evolved. Therefore, the national cultural heritage with rich regional characteristics has been left behind, providing an inexhaustible source of ideas, and constantly inspiring creators to explore the footprints of nomadic culture (Li, 2018). The traditional handicrafts thus accumulated are rich in imagination, diverse in form, with distinct regional characteristics and unique ethnic cultural elements, covering customs and customs of multiple ethnic groups and multiculturalism.

Ningxia is only one mountain away from the Alxa Plateau in the northwest of the Helan Mountain. During the Ming and Qing Dynasties, it served as an important link from the northwest to the Central Plains and assumed the task of a transportation hub. This provided certain convenient conditions for the formation of a unique regional style for Ningxia carpets. Ningxia carpets are one of the main handicrafts in this area, mainly produced in Yinchuan, Yanchi, Zhongwei, Wuzhong, Xiji, and other places. They are woven from wool produced in Ningxia and Alxa. A large number of Ningxia carpets were traded in Alxa and found wide usage there. Due to their excellent quality, fine workmanship, and unique dyeing technique that make the colours brighter and more vibrant, Ningxia carpets were not only designated as temple blankets by the Qing government but also regularly presented to the imperial court as tributes and gift blankets. History has established two major categories of Ningxia carpets: temple blankets and tribute blankets, including those used for royal gifts (Ningxia Antique Carpet, n.d.). A large number of Ningxia carpets can be seen among the precious antique carpets collected by the Palace Museum in Beijing.

Historically, the handmade craftsmanship of Ningxia carpets has a long history of development and incorporates rich cultural connotations. In the long history, Ningxia carpets can be woven into almost any form: large palace carpets, long and narrow Kang blankets, pillar blankets, saddle blankets, cushions and back blankets, etc. (The handmade carpet of Yanchi is a living artefact that tells the story of history, 2018).

Raw material selection

Ningxia carpets mostly use lustrous, soft, bright and elastic wool. These sheep are mostly Tan sheep that grow in Yanchi, Ningxia, and purebred sheep in the Alxa Grassland in the northwest of Helan Mountain. Wool is most frequently used, although wool, silk and jute are common materials, as are grass and man-made materials such as nylon and polypropylene. Therefore, the raw materials of Ningxia carpets are characterised by long pile, soft feel and rich pile content.

Process flow

The craftsmanship of handmade carpets in Yanchi, Ningxia is a time-consuming and labour-intensive work. It has to go through more than ten steps such as drawing, wool picking, wool washing, spinning, dyeing, rewinding, weaving, smoothing, cleaning, trimming, old-fashioned, and carpet wiping. It takes at least three months to half a year to complete a qualified handmade carpet (Figure 1).



Figure 1. Carpet made by Ningxia folk craftsmen in the late Qing Dynasty
(Source: *The Carpet Knowledge of Ningxia Carpets: "Official Kilns" within Carpets, 2018*)

Ningxia carpets use a detailed knotting method, and hand-knotted carpets are tied with "∞" buckles. The weaving density is 11-15 knots per 5 cm in the longitudinal direction, and the thickness is 5-8 mm. This kind of weaving density and thickness is strong and stable, and it will not rot after many years of use (Zhang, 2021).

Pattern modelling

In terms of patterns and shapes, compared with carpets from other regions, Ningxia carpets have extensively absorbed the traditional carpet weaving skills of various ethnic groups and the elements of Northwest folk culture and art. Ningxia carpets can be found in the patterns of flowers and birds, Baoxiang patterns, and porcelain patterns in the Central Plains brocade. There are also auspicious patterns such as wealth and longevity, promotion and wealth, many children, and many blessings, which are based on the patterns of brocade, embroidery, and porcelain of the Han nationality. As well as the decorative patterns on the silver and bronze wares of the Mongolian and Tibetan nationalities, as well as the auspicious patterns on Jingdezhen porcelain. At the same time, Ningxia carpets are influenced by the patterns of Xinjiang carpets, which incorporate the geometric brocade patterns of Uyghur carpets, forming the characteristics of diversified patterns of Ningxia carpets (Li, 2015).

The composition of Ningxia blankets is mainly based on "metrical style". "Metric style" is a rule summed up by our ancestors based on the understanding of the "square" and "eight" of celestial bodies. The composition of "Metric Style" pays attention to the coordinated layout of surround, symmetry and centre, and is mainly composed of "kui", "corner" and "side". It can bring a sense of stability and tranquillity to the decoration environment, and it is one of the most representative patterns of ancient Chinese carpets (Figure 2).



Figure 2. Ningxia carpet pattern
(Source: *The Carpet Knowledge of Ningxia Carpets: "Official Kilns" within Carpets, 2018*)

Colour

The dyeing technique of Ningxia carpets is extremely unique. Due to the dry climate and sparse vegetation in Ningxia, craftsmen often extract natural pigments from plants such as bitter beans, oak camels, indigo, and lacquer trees. The natural pigments extracted from these plants gradually penetrate more and more with prolonged use, ensuring that the carpets maintain a long-term natural, uniform, and bright coloration. Blue, yellow, camel, and wood red are commonly used colours in Ningxia carpets. For example, in blue patterns, yellow, red, and moon white are complementary colours.

Since Ningxia carpets were used by the royal family in the Ming and Qing Dynasties, they must follow the strict feudal hierarchy in the Ming and Qing Dynasties to distinguish colours. Yellow is reserved for the royal court, and red is the colour used by princes and nobles and the upper class. In addition, Ningxia carpets are widely used in Alxa temples, and the tops of Tibetan Buddhist buildings, temple decorations, and temple carpets are all yellow. Therefore, traditional Ningxia carpets are also widely used in yellow (Zhang, 2021).

METHODOLOGY

In the first and second steps, researchers built a design affairology framework (Diagram 1) based on the theoretical foundation of design affairology. This framework (Diagram 2) was developed specifically for the cultural creative design of traditional handicrafts of Intangible Cultural Heritage (ICH), with the aim of conducting foundational research in design affairology for the handmade carpets of Yanchi, Ningxia. The third step involves the concrete design expression based on this framework.

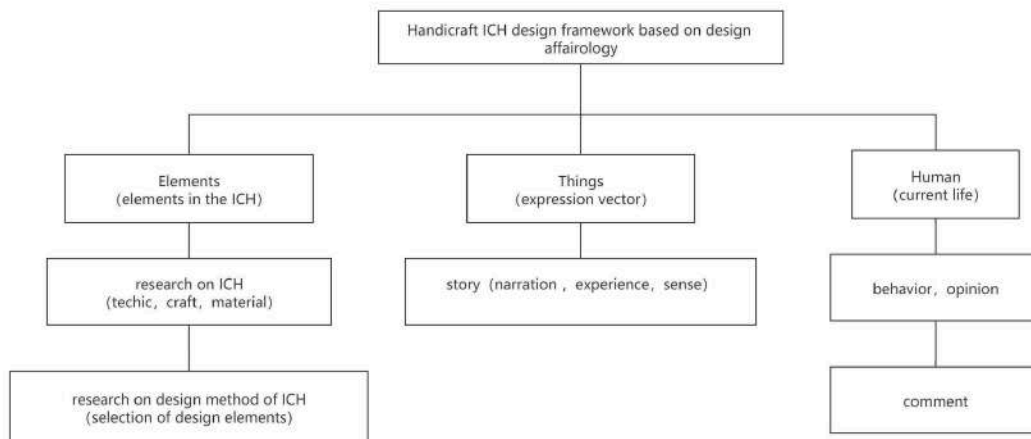


Figure 3. Diagram 1 Handicraft ICH design framework

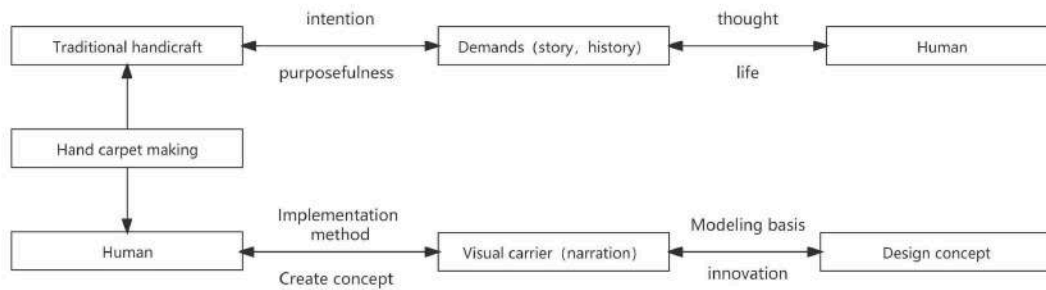


Figure 4. Diagram 2 Step diagram from element to “thing”

In the first step, as mentioned in Diagram 1, the research begins by studying the elements of Intangible Cultural Heritage (ICH) itself, transitioning from design of "thing" to design "elements". This is done by considering the limiting factors such as time, space, and behaviour, as well as the behaviours, concepts, and evaluations of individuals involved in the affairs. By doing so, the researchers establish the design objectives. Based on this, the research team further refined the research elements and structure of the Yanchi handmade carpets in Ningxia, from the perspective of transitioning from "thing" to "elements". Field research is conducted on historical, cultural, customs, and habitual aspects. The design objective of this study is to guide the creative process through the research narrative, incorporating historical and cultural elements, and modernising the conversion of ICH elements. Ultimately, the aim is to create cultural and creative products that skillfully select ICH elements in line with popular aesthetics and modern lifestyle needs.

In the second step, as shown in Figure 3, the researchers choose the medium of weaving as the expression of "element", deducing materials, techniques, forms, colours, and more for cultural creative design. This process focuses more on the "thing" rather than just the "element", transitioning from the physical aspect to the meaningful aspect. During the production of traditional handmade carpets, artisans choose to weave and twist threads by hand. During this mechanically repetitive and lengthy process, people would sing songs while working, creating a unique labour custom with a distinctive charm. Compared to the exquisite craftsmanship of the Yanchi handmade carpets, the narrative aspect of weaving can better express a cultural way of life. Within specific time, environment, and information, the emotional transmission of "narration" can be experienced more deeply.



Figure 5. Diagram 4 Extraction of elements

In the third step, specific design expressions are carried out, with a focus on explaining the expression of patterns and colours, utilising one of the works created by the research team. In the upper

part of Diagram 3, the researchers extract the framework of the weaving "thing" in terms of patterns. They select the basic design elements from traditional handmade carpets, which include flower patterns, longevity patterns, geometric patterns, and other auspicious symbol elements that are concise, visually appealing, and in line with modern aesthetics. These elements are ultimately incorporated into the physical form of the visual medium, with their own compositional orientation. In Diagram 3, the composition continues the traditional carpet grid pattern, based on the nine-square grid composition, and incorporates circles and straight lines as the framework. During the design process, it is important to preserve the authentic cultural significance while eliminating any other distracting meanings, ensuring a pure and distinct modern sense.

In terms of colour expression, as shown in Figure 6, the researchers incorporate cultural creativity while respecting the original "thing". Traditional Yanchi handmade carpets extract dyes from natural plants and minerals, utilising ancient dyeing techniques. This allows the materials to naturally absorb pigments at room temperature for a long period, providing colour protection. Therefore, drawing inspiration from the basic colours of blue, red, yellow, and others in the original Yanchi handmade carpets, which represent history, culture, nature, and simplicity, these traditional colours correspond to the modern perception of novelty, vibrancy, safety, and stimulation. This forms the basis for the colour scheme.

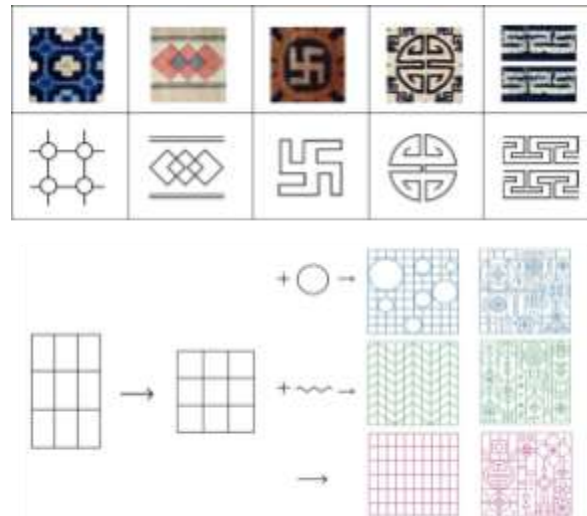


Figure 6. Zhang Ying's Yanchi handmade carpet design work
(Source: Zhang, 2021)



Figure 7. Zhang Ying's Yanchi handmade carpet design work
 (Source: Zhang, 2021)

The core application of the methodology of Design Doctrine is to incorporate the design elements of intangible cultural heritage traditional crafts "thing" into the experience of "element". Therefore, based on this, establishing an evaluation system from the perspective of Design Doctrine can evaluate various aspects of decision-making and creative product design. The goal is to ensure that the narrative process remains centred around "people" and that the design of the product is "appropriate and reasonable".

FINDINGS

The study of Design Affairiology explores the advantages of cultural and creative design

Based on the theoretical foundation of Design Doctrine, cultural and creative designs have the characteristics of clear thematic expression and coherent structure, making them a new path for the innovation and development of traditional crafts. Traditional craftsmanship involves complex and labour-intensive processes, particularly in tasks such as wool washing and dyeing, which are difficult and time-consuming. With the introduction of modern mechanised production in handmade carpet production, traditional processing methods and tools are gradually being replaced, making it challenging to sustain the original characteristics of handmade carpet craftsmanship. The average age of traditional craftsmanship inheritors is relatively high, and many young people are no longer willing to learn these skills. Cultural and creative design offers higher efficiency and wider dissemination channels, making it easier to integrate into various aspects of modern life. With the research methods based on Design Doctrine, both individual innovations and thematic series research and innovation can be carried out. On the other hand, it also provides a solution for the digital preservation and inheritance of Ningxia carpets, helping to digitally present the cultural patterns of Ningxia carpets.

Advantages of Design affairs involved in ICH handicrafts

The innovative application of Design affairology in traditional handicraft products can be said to provide a new way of expression for ICH, and it can also be said to be an opportunity for ICH handicrafts to continue the tradition in a different form. Design rationale guides designers to immerse themselves in specific "things" to dig out the starting point of design. The final new design of this article not only retains the pattern and rhythm elements of traditional Ningxia carpets, but also retains the designer's personal creative perspective, incorporating his understanding of traditional culture and style characteristics. The results can be applied directly or can be used as a source of material for traditional craftsmen. Therefore, when traditional craftsmen cooperate with designers, they can also change their thinking from designing "elements" to designing "things" and can better continue traditional skills in modern life in a more connotative way. Make Chinese traditional handicrafts meet people's living needs in traditional forms, and at the same time promote the revival of traditional handicrafts.

ICH Handicraft Sustainability Innovation

Cultural and creative design can activate the innovative driving force of handicraft ICH. Through cultural and creative design, handicraft ICH can better integrate into modern life and intersect with people's daily lives. Cultural and creative design also endows cultural connotation and commercial added value through intangible cultural heritage and traditional handicrafts. Handicraft ICH and cultural and creative design develop together and complement each other. With the continuous development and innovation of cultural and creative design in recent years, if ICH cultural and creative design wants to better cope with the modern social lifestyle, it must modernise the ICH elements and integrate typical elements into modern daily life through products. Successful transformation of modernity requires effective use of regional characteristics and regional economic resources, active inheritance and innovation in parallel, and exploration of internationalisation paths based on nationalisation. Only when people are willing to experience, use and disseminate widely can they better inherit the excellent traditional culture of the Chinese nation.

The sustainability Ningxia carpets not only has general cultural heritage products, but also has individual characteristics. Through the work presented in this paper, we aim to address the bottleneck of production technology and improve ICH handicraft production cycle is slow, traditional forms are difficult to adapt to modern society. This model will surely provide more convenience for the creative design of traditional crafts and provide strong technical support for the innovative creation of crafts, thus expanding the sustainable development of ICH crafts.

CONCLUSION

Based on the research on Ningxia carpets, the proposed design framework is of great significance for the innovative design of ICH craftsmen and the cultural and creative design of designers. In this article, from a practical point of view, design affairs combine ICH traditional skills with cultural and creative design, creating a new way for ICH-related design developers to research. Realising the modernization of ICH products through cultural and creative design is just one of the ways of intangible heritage + protection. In order to achieve effective cooperative development, it is also necessary to have an international vision for all-round development, effectively utilise regional characteristics and regional economic resources, actively carry out inheritance and innovation in parallel, and explore internationalisation paths based on nationalisation. This article also has certain limitations, and the influencing factors of digitalization and branding are also crucial to the development of Ningxia Carpet and other ICH. Looking forward to the research of scholars in related majors to supplement the deficiencies in this area, so as to promote the sustainable development of ICH.

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Watch and Learn: Imagery Design Process for Weaving Crafts

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ABSTRACT

Weaving craft is one process that produces woven textile products that can be constructed by hand or machine. Different theories and techniques for putting forth ideas lead to distinctive products among textile designers. New designers or weavers were unable to deduct the design process, particularly in woven textiles, from the existence of a textile designer due to a lack of references. This paper shows the weaving design process of woven textile art making to form the imagery weaving as its surface design. The primary objective of the warp-paint procedure is to emphasise the design image on the woven surface. The design process can be done manually by integrating the research into the subject matters, motif development, and the weaving process. The most detailed part of this research will be on the weaving process which shows the warp-paint colouring technique as the main approach to form the imagery weaving. The methodology would be carried out by incorporating a qualitative approach, which would involve literature reviews, interviews, observations, and fieldwork. The output of this article will serve as a resource for aspiring new weavers or textile designers who want to use the suggested idea to produce woven products with imagery design patterns. According to the study's findings, this approach

calls for knowledge of weaving procedures and weaving handling expertise to make the intended image more clearly visible on the weave's surface.

Keywords: *Design Process, Imagery Technique, Weaving Crafts*

INTRODUCTION

Crafts are artistic creations that require human hand skills to complete, and they typically result in visually appealing prefabricated goods. To become a skilled craftsperson, one must put up consistent effort with perseverance, bravery, skill, and continued viability. Crafts involving weaving are human creations that are impacted by other people and their environment. They depend on human hand skills, accuracy, and keenness (Suprianto et al., 2020). The definition of handicraft is "those items possessing clear artistic value or those with demonstrated export success, including any occupation that involves manual labour, fine handloom weaving, woollen pile carpets, engraved metalware, tie-dyed textiles, block-printed textiles, embroidered textiles, and hand-knotted carpets" (Anggadwita et al., 2023). While craft is a method of working with readily available materials, art and craft are expressions of human creativity that can differ from one another but can also share some similarities. Art is an expression of sentiments and emotions (Inocian et al., 2019).

Among the industrial sectors in the Industry 4.0 era with the most potential for explosive expansion is the creative economy sector. The arts foster the creativity, critical thinking, and cultural sensitivity of performers. The artist or textile designer's critical thinking and creativity are required for the adaptation of the theories learned in making textile designs (Permatasari et al., 2023). Weaving is an ancient textile art and older craft whose time is still unclear or unknowable. The process of creating weaving always involved two sets of yarn (Qureshi et al., 2022). Weaving is the process of integrating two sets of threads interlaced at a straight angle of 90 degrees to one another to create woven fabrics. It involves the weft (horizontal thread) moving through the warp thread (in and out) while the warp (vertical thread) is tied to the loom or frame. In other words, the weave is the process of two sets of threads that are perpendicular to one another and interwoven together often making up woven cloth (Suprianto et al., 2020). The harsh exploitation of woven textile structures, materials, and colour can reveal its design. The woven fabrics can be produced manually or on a loom. Up until the development of complex machinery to make woven cloth, the woven fabric was formerly produced by hand and was also known as non-loom woven. Weave products can be seen as warp-faced weaving and weft-faced weaving. It depends on the dominance of material uses, sizes, colours, and techniques applied. Weave can be structured by integrating plain weave, twill weave, and sateen weave. Applying all these structures can produce a pattern, texture, fabric strength, colour, look, feel, effects, cost, and so on (Redmore, 2011).

The production of woven craft, especially imagery weaving, may involve a few processes to make the design well done. The researcher had gone through the process of weaving by adapting the conceptual framework created as shown in the previous journal about the ideation of woven textile art. The framework involved research drawing, idea development of motifs and patterns, and the weaving process before it became woven textile art (Zainab et al., 2022). This research is an exposure to new designers or weavers to form an imagery weaving by implementing a variety of techniques and processes.

LITERATURE REVIEW

What Others Had Done to Form Imagery Weaving?

In Malay art, the implementation of Mathematical concepts is evident in the delicate and creative composition and pattern, which suggest meaning. It is seen in wood carving, *mengkuang* weaving, *songket* weaving, and other artistic mediums. Producing art demands a combination of abilities, imagination, critical thinking, and understanding of the natural world. Through this method, the image of woven fabric can be seen by creatively combining the mathematical concept and traditional way of creating woven art (Norazlina et al., 2022). Songket is the name of a weaving product that is produced in Malaysia. The textile motif and pattern known as "*kembang semangkuk*" inspired by medicinal purposes. The motif effectively conveyed the idea of the study's subject from, "*kembang semangkuk*", then turned the image of subject matter to *songket* motif which is used as an inlay technique in *songket* weaving. The researcher asserts that a *songket* lacking motifs and arrangements is not a true work of *songket* art (Arba'iyah, 2019).

As weavers, the researcher already knows that the narrative is told through the tapestry weaving technique. In mediaeval Europe, tapestries were hung as visual images that served a variety of functions, including reading and displaying social and political power (British Tapestry Group, 2020). Most artists also use tapestry weaving to form imagery weaving and mix it with painted warp or painted on silk background. Besides tapestry weaving, also known as pictorial weaving, imagery weaving is another type of art that may be created by fusing mixed media, the colouring process, weaving devices, and weaving structure. There are numerous ways to create imagery weaving in woven textile art today, however, the techniques used may vary depending on the type of product being created. The artist also uses handloom to create the structure or texture by integrating the dyeing technique, paint, embroidery, and textile manipulation. Besides, they are also helped by digital computer-aided design (CAD) in the jacquard loom. The CAD/CAM system in technology enables the creation of documents that are not dated in a short amount of time, making it more straightforward, faster, more efficient, and more reliable (Kovačević et al., 2021). This statement was also said by Chan et al. (2017), decorative patterns in textile are always helped by digital technology in order to make them quickly produce rather than using the old method. An example of imagery weaving had been done by cooperating with the modern and traditional methods of producing weaving such as hand jacquard loom and dobby loom where this method is to produce imagery weaving through hand controls. The jacquard loom can produce different types of images and appearances on the fabric surface. There are also the researchers create and advance method in producing weave craft by using 3D weaving where it integrating the used of stencil block and jacquard loom to create the multilayer of image on weaving (James et al., 2020). A study had presented an image-processing-based, non-invasive, low-cost fabric weave identification scheme. This study produces fully automatic weave using digital image processing with accuracy in detecting fabric weave type in real-time (Qureshi et al., 2022).

The combination of various techniques of colouring process and weaving structure can affect the surface of the weaving image. Coloured warp threads in the weaving process can be highlighted through the selection of weaving techniques and the combination of colours to be emphasised (Mathur & Seyam, 2011). The process of making a painted warp is a bit difficult, but the painted warps are beautiful to see. Stossel (2015) stated that the technique of colouring this thread is very beautiful even though it has not been woven yet. She has used plain weave techniques to produce a scarf that went through a painting process on the warp threads. In Japan, Kasuri is another name for the woven fabric produced by integrating resist dyeing techniques such as printing and dyeing which produces the pattern on the un-dyed areas (Hemström, 2020). "*Ikat*" is one of the techniques that have a similar effect to warp-painted design to form the imagery weave in a fast way. This technique can save time in creating patterns on the weaving product and can be produced more easily compared to the *Ikat* technique (Steel,

2014). According to one newsletter created by Tien (2017), in order to show off our painted warp, she had shared about 4 tips to make it clearly to see which are using the denser sett to make the weave shine, used the finer weft yarn during the weaving process, choose the warp dominant structure such as twill weave as the main structure and create the block of colour alternately for warp and weft yarn during the weaving process.

RESEARCH METHODOLOGY

The methodology would be carried out by incorporating a qualitative thematic approach, which would involve literature reviews from books, journals, and articles, interviews, observations, and fieldwork. The output of this article will serve as a resource for aspiring new weavers or textile designers who want to use the suggested idea to produce woven products with imagery design patterns. The fieldwork had been done by following the conceptual framework as shown in Figure 1.

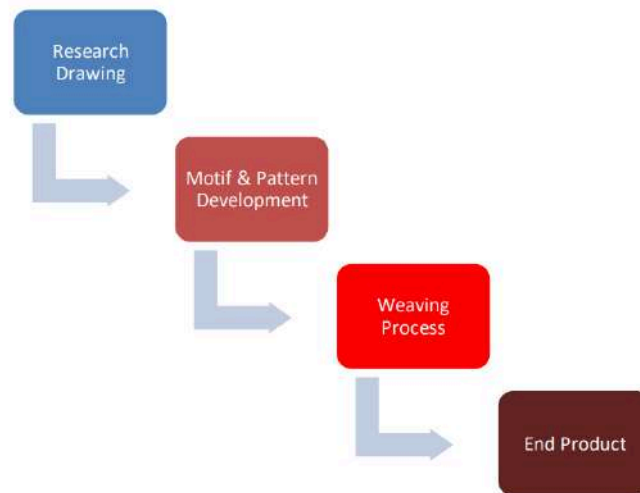


Figure 1. Conceptual Framework
(Source: Zainab et al., 2022)

The Process: Research Drawing

Before making some designs, the new textile designer or weavers needs to start the design with research and drawing on the theme and the subject matter to study. “If textile designers do not embark on and utilise textile research we will be left in a ‘sole less’ vacuum...”, this is supported by Montgomery (2010) that textile designers can benefit from more knowledge in textile production if they start with design research. The creative textile designer or artist should have good skill in drawing to make the textile art either in decorative or technical elements. In addition, the textile designer or artist tends to know every single part of the subject matter we studied. The observation and the sketches of the subject matter are one of the right ways to make our textile design accepted and well-used later. Both observation and sketches drawing developed to form the element of textile motifs and also patterns (Gürçüm, 2017).

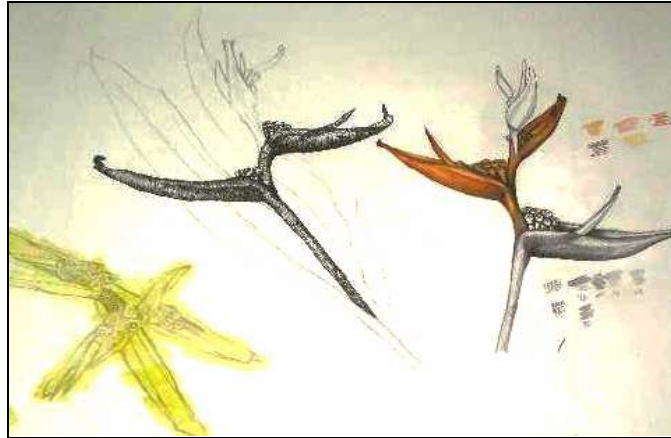


Figure 2. Exploration Drawing on Heliconias Species, Mixed Media Techniques
(Source: Author's personal collection)

The interpretation of the subject matter can be different based on the artist or designer's background. Through the subject matter, the creativity of the artist or designer can be examined. This statement can relate to McKinley (2021) who wrote about lessons of subject matter, when more than two artists study the same subject matter, it will make the painting more interesting because all the artists have their perspectives and views. The new textile designers or weavers can inspire the subject matter either from nature or man-made. Examples of subject matter from nature are the plant motif, flowers motif, and animal motif, meanwhile the man-made motif can be inspired by things, buildings, transportation, etc. Ideas are sought after at the start of most motifs. It is amazing how they can select, refine, and shape a perception into something concrete, appealing, and different. Denaturalization and styling are methods used by the weavers to demonstrate their inventiveness and maturity in selecting the source of patterns (Arba'iyah, 2019).

Figure 2 above shows the example of research drawing study on a natural plant motif which is Heliconia Flower. Before we deal with customers or produce artwork, new textile designers or weavers need to begin the design with research and drawing or sketches and presentations about the concept of design they want to bring up. Both sketches and designs will help the new textile designer or weavers to make any textile surface design later. After the process of sketches has been done, next to be done are the motif and pattern development, then followed by the weaving process.

Motif and Pattern Development

Zaity (2019) defined a motif in art as a repeating idea, pattern, image, or subject that designers should explore since it influences people's emotions. In any kind of art and design, motifs are commonly developed and will become the pattern (Zamrudin et al., 2019). Motif is a single thing produced to form a pattern by applying stylization and repetition. Designers may be inspired by floral and plant, abstract, geometric or organic, sometimes the production of motifs can relate to culture or style or area of study. The uniqueness of the motif can be seen through its detailing and also the beauty of the pattern created. Each element of the motif created sometimes brings its implied meaning such as symbolic, and philosophical, and also can relate to socio-cultural, aspects, religious, beliefs, customs, norms, values, taboos, and people's outlooks on life (Irwan Sharfizan, 2022).

Motif development can be produced by hand-drawn manually or in computer-generated imagery. This paper had shown the motif and pattern created manually which is hand drawn. Before starting the

new design, the new textile designer or weavers should start with motifs development and the other methods to complete the design making (Mohd Azhar, 2012). Nani Hartina et al. (2019) divided the steps of the weaving process for her studies about Kain Punca Potong (KPP) into two routes such as design process and technical process. The development of motifs was one of the important steps to complete the textile design (Sharma et al., 2016). A research paper mentioned that the motifs, the design, and the textile product were the key element in the production of the Malay Peninsula traditional textile (Mohd Azhar, 2012).

The process of motif selection depends on the theme or concept we planned and also started with the search for ideas (Arba'iyah, 2019). The motifs may be inspired by the culture, religion, environment, and history of textiles. The motifs can be in any kind of shape or composition, different sizes and the motifs can be a larger work if the combining and repetition technique of pattern and design were applied. The example of motifs studied by the Malaysian normally inspired by nature where the motifs were related to life and surroundings such as, plants, vegetation and domestic animals (Mohd Jamil & Arba'iyah, 2019).

In this study on heliconia species, the researcher created a woven product that was influenced by flora. The chosen themes are influenced by other Malaysian woven fabrics, which are frequently inspired by nature. The majority of motifs are created utilising realistic drawing, which is the researcher's preferred approach. This design's colour study was inspired by the variety of colours found in heliconias. Eight distinct pattern ideas with various styles and strokes were developed by the researcher (refer to Figure 3). Most of the pattern designs look like a painting and then will turn into woven textile art. After the designs are ready, the researcher produces 3 series of woven textile art by 3 selected designs.



Figure 3. The Proposal of Pattern Ideas 1 to 8.
(Source: Author's personal collection)

Weaving Process

The process of creating fabric or cloth is called weaving. This weaving art structurally and procedurally will involve the interlacing of the complex set of yarn which is warp and weft yarn (Morabito, 2022). These procedures followed similar steps to the *Tenun Pahang Diraja and Songket*

weaving processes used in Malaysia. The difference is that the item is a conceptual art piece. In order to create imagery weaving, a few steps of material, method, and colour research will be required. The steps of the weaving process are started with pattern drafting, yarn calculation, warping process, colouring process (warp-paint, dressing loom (drawing in and denting) and weaving process.

The mix of woven structure, such as plain weave and variety of twill weave, is the design criterion for this woven textile art. To highlight the design using the twill weave 3/1 and warp paint colouring approach, the researcher created the warp-faced weave. In order to create a relief design on the woven surface, the researcher mixes various weaving techniques, including open-warp and open-weft weaving, hand embroidery with a machine, and inlay weaving (see Figures 4 to 9) as a decorative method to produce images on woven surfaces. The inlay technique used in the *songket* process involves using gold and silver threads from the weft (*pakan*) side of the weaving to create a design (Azizi et al., 2015). The research of various thread types gave the woven textile art a more intriguing appearance and increased aesthetic value. Stossel (2015) created an inlay technique to get the textured textile surface by integrating the ribbon, colourful threads and textured yarns. (Technique, 2018) stated that Moorman inlay is similar to painting with yarn while weaving a backdrop cloth underneath. Using a tie-down system of warp yarns, the Moorman Technique inlays additional weft threads. The inlay weft is layered over the plain weave ground; the inlay threads are not visible on the reverse side of the cloth.



Figure 4: Inlay Technique and Machine Embroidery on Warp-paint Woven
(Source: Author's personal collection)



Figure 5. Inlay Technique on Warp-paint Woven
(Source: Author's personal collection)



Figure 6. Inlay Technique on tie and dye woven
(Source: Student's collection, Nur Insyirah Isa, 2024)



Figure 7: Tepus Tanah motif as Inlay Technique on Warp-paint Woven
(Source: Student's collection, Muhammad Danish Suhardi, 2024)



Figure 8: Cucumber Seed Motif as Inlay Technique on Warp-paint Woven
(Source: Student's collection, Nur Qistina Aiya' Hishamudin, 2024)



Figure 9. Cucumber Slice and Seed Motif as Inlay Technique on Warp-paint Woven
(Source: Student's Collection, Nur Qistina Aiya' Hishamudin, 2024)

The researcher decides to use a table loom to explore woven textile art for the final product (jack loom). The procedure began with determining the size of the woven fabric using yarn calculations, pattern drafting for the product's surface and structure, materials, the warping process, and also the investigation of colour. Weaving documents is the process of pattern drafting (Piroch, 2004). When all of these components are available, weaving can be completed quickly. The weaving process is illustrated in Table 1 until Table 5 listed below, which also includes the yarn calculation, pattern drafting, material type, warping process, colouring process, and weaving process.

Table 1. Yarn Calculation and Pattern Drafting

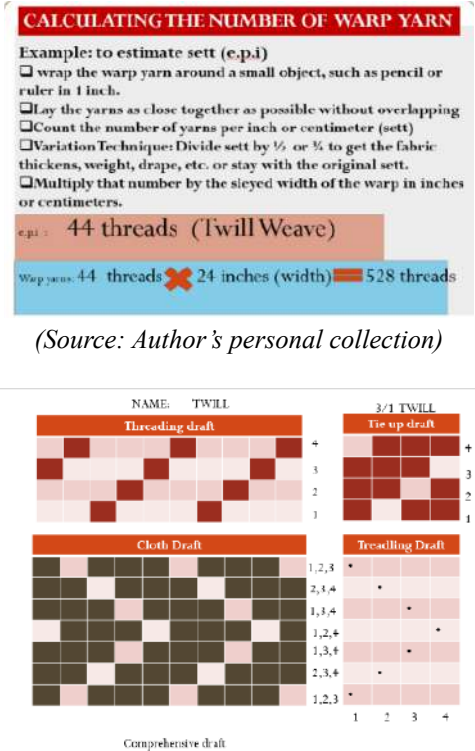
No.	Description	Images
1	<p>Design Criteria: Woven Textile Art Length: 3.6 metres Width: 24 inches Material: Cotton Yarn size 02 (Brand: Anchor)</p> <p>Before the product is made, the design criteria listed above should be planned. To ensure that the weaver receives the precise size, thickness, and style of the finished product, yarn calculation is a crucial stage that should be started. In order to set up the length and width of the finished product, the weaver should figure out how many yarns will make up the warp. Moreover, the extra allowances may be added as accessories and shrinkage. The material can also affect a product's thickness and dimension. The process of creating a pattern involves creativity; the finished product will be visible. This pattern might serve as a guide for the weaver to later decorate the loom.</p>	 <p>(Source: Author's personal collection)</p> <p>(Source: Author's personal collection)</p>

Table 2. Warping Process


No.	Description	Images
1	<p>The purpose of this method is to determine how many yarns should be used for the warp and to obtain the weaver's cross. 528 yarns are required to warp on the warping board (refer Table 1 process). Before placing the threads on the loom, the weaver's cross is used to determine the direction of the vertical yarns. Depending on their comfort level, the weaver can also utilise various warping mills, such as those shown in the right side. The weaver should warp the strands with the same motion in order to maintain the yarn's tension.</p>	 <p>Warping Mild (Source: Piroch, 2004)</p>

Table 3. Colouring Process- Warp Paint



No.	Description	Images
1	<p>Lay the threads down on a surface, such as a table or floor, and use the drawn pattern as a reference point at the bottom of the threads. To maintain the tension of the yarns, the lease sticks on both sides should be fastened to a fixed object. The dyestuff employed by the researcher were fabric dye and printing paste. It takes between one and two days for the colouring procedure to dry, at which point flat brushes must be used. If the colour does not penetrate well into the strands, colouring can be applied to both sides.</p>	 <p>(Source: Author's personal collection)</p>  <p>(Source: Author's personal collection)</p>

Table 4. Dressing loom- Drawing in and Denting


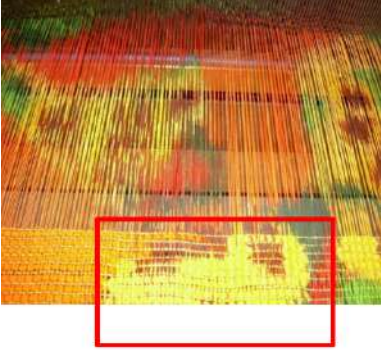
No.	Description	Images
1	<p>Pattern drafting determines how the threads are arranged on the loom. The design to be inserted into the heddle's eye was chosen by the researcher as the Twill Pattern (refer Comprehensive draft on Table 1). The Reed's balance and desired weave thickness determine how many yarns are used.</p>	 <p>(Source: Author's personal collection)</p>

Table 5. Weaving

No.	Description	Images
1	The researcher combined the techniques of plain weave (1/1) and twill weave (3/1). In order to provide additional tone to the blurred motif in this weaving, the inlay technique (on the red box) has been used. Using complementary colours in the weft yarn helps further emphasise how the colours are integrated in the motif.	 <p><i>(Source: Author's personal collection)</i></p>

FINDINGS

The finished products were completed in two to three months, finishing included. Because of the techniques used, such as the warp-paint colouring technique, the warp-face weaving structure (twill 3/1), inlay, and embroidery technique, the motif was very easy to perceive. The researcher's handling of the threads during the preprocessing of colouring and preparing the loom was another important factor to consider for a successful outcome. Several techniques require at least one helper to achieve the finest results, particularly while dressing the loom. Table 6 until Table 8 listed below shown the finished products.

Table 6. Final Product of Imagery Weaving Craft


No.	Description	Images
1	Material: Cotton Thread size 02 & Nylon Thread Technique: Warp-paint, twill weave (3/1), plain weave (1/1), inlay and embroidery. On the right side is the design idea while on the left side is the final product	 <p><i>(Source: Author's personal collection)</i></p>

Table 7. Final Product of Imagery Weaving Craft



No.	Description	Images
1	Material: Cotton Thread size 02 & Parcel Rope (size 03), Technique: Warp-paint, twill weave (3/1), inlay. On the right side is the design idea while on the left side is the final product.	 <p><i>(Source: Author's personal collection)</i></p>

Table 8: Final Product of Imagery Weaving Craft

No.	Description	Images
1	Material: Cotton Thread size 02 and Fancy yarn Technique: Warp-paint, twill weave (3/1), open-weft and open-warp. On the right side is the design idea while on the left side is the final product.	 <p><i>(Source: Author's personal collection)</i></p>

CONCLUSION

In conclusion, in order to make the intended picture more clearly apparent on the weave's surface, this approach necessitates an understanding of weaving techniques as well as weaving handling expertise. Accentuating the pattern image on the woven surface is the main goal of the warp-paint process. The new weaver or student can use this documentation of work as a resource to create textile artwork made specifically for imagery weaving.

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Media Art in Healthcare Environments: Enhancing Student's Well-being and Mental Health

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ABSTRACT

New media art refers to works of art that have been developed or created through the combination of art and technology. New media art encompasses any contemporary art forms created, edited, or transmitted using new media technology. It includes digital, interactive, online, virtual, video, sound, and artworks made using robotics, video games, biotechnology, 3D printing, and computer animation. As a result, many studies have been conducted on the use of arts to promote a balanced way of life and the value of art in the healthcare setting, however, a lack of study on media arts as an art-based intervention in the healthcare environment. Therefore, the purpose of this research is to identify the existing elements and characteristics of the artworks in the healthcare environment and propose a prototype media art as a new art-based intervention to enhance a pleasant healthcare environment and potentially promote well-being and mental health among students in the institutional healthcare environment. This is qualitative research involving interviews with doctors and experts in fields and observation in Pusat Sejahtera Universiti Sains Malaysia, Pulau Pinang. The semi-structured interview and observation will be recorded through an audio-video recording system. As a result, this research will develop a prototype of media art that will be produced using a combination of art and technology. These include interactive art, sound art, visual, and computer art. This prototype will give students, visitors, and staff in healthcare a good impact and enjoyable experience in healthcare environments that may be undergoing stress while waiting for the treatments or after the treatment. This research's significance is beneficial to academia, the institution's healthcare environment in Malaysia, and students' well-being and mental health. As mentioned by the Director-General of Health, Datuk Dr Noor Hisham Abdullah, the future healthcare facility design goals are to create a healing environment, including art and hospitality.

Keywords: *New Media Art, Art-Based Interventions, Healthcare Environment*

INTRODUCTION

Art is well known for visually expressing thoughts and feelings that are difficult to describe in words. It is a potential method for assisting people in exploring their emotions and beliefs, reducing stress, resolving challenges and conflicts, and improving their overall well-being. Art can heal people emotionally and physically, which has led to the creation of healing arts (Malchiodi, 2004). Similarly, Armstrong (2021), posited that art holds healing potential. Art serves as one of the innate healing powers accessible to all, fostering interpersonal connections among individuals. Furthermore, the use of arts activities has been identified as holistic, non-medical, and cost-effective interventions that have the potential to promote public mental health and well-being (Jensen & Bonde, 2018).

According to Davies et al., (2012), there are five types of arts engagement: (1) performing arts; (2) visual arts, design and craft; (3) community/cultural festivals, fairs, and events; (4) literature; and (5) online, digital and electronic arts. Carswell et al., (2019), an art-based intervention involves using arts activities to provide a creative experience in a healthcare setting. Arts have been demonstrated to have a range of impacts in hospital settings in previous research (Staricoff Duncan, et al., 1991), including decreases in physiological stress indicators such as blood pressure and reduced anxiety and melancholy. Many arts programs promote people's well-being by enhancing their quality of life and enjoyment. Patients and staff value the function of the arts in improving well-being, reducing stress, and diverting attention away from worries, and these components are seen as essential (Staricoff, 2004). According to the World Health Organisation (WHO) in Europe, "Engaging with the arts can benefit both mental and physical health" (Fancourt & Finn, 2019).

Based on that, this research is important in the Malaysian healthcare environment because there are still insufficient studies in the existing literature on using media arts as an art-based intervention in the healthcare environment. Media art encompasses a broad spectrum of artistic expressions that utilise various forms of media, including digital art, video installations, interactive exhibits, and sound installations. According to Çaskurlu, (2013), new media arts study human interaction via the mediums of films, photography, video, music, computers, digital arts, and interactive media. Space, time, light, motion, colour, and sound express their perspectives, feelings, and ideas. Meanwhile, Salah Uddin (2018), new media art often involves interaction between the artist and the observer or the observer and the artwork.

In healthcare settings, media art can be integrated into physical spaces, such as waiting areas, patient rooms, and treatment areas, to create immersive and engaging experiences. From the study by Chen et al., (2009), the visual melody is an interactive installation that encourages individuals to engage with and play with relaxing visuals and sounds, giving people a more relaxing experience. It is designed to assist parents and caregivers in distracting and entertaining young children and provide a more pleasant experience for adults who use it. The therapeutic use of new media art in healthcare, according to this research, is still in its early stages. Similar to a study by Biddiss et al., (2013), an interactive media display for a paediatric hospital clinic creates a unique waiting room that responds to the increasing need for accessible, contact-free play alternatives. In addition, waiting in hospital settings may be stressful for children and their accompanying family members. Positive diversion opportunities have decreased waiting anxiety, resulting in better health outcomes. Other studies, a qualitative study explored the use of Virtual Reality (VR) in art therapy, it is applicability of VR expressive arts making tools in the creative arts therapist. The findings show that VR-based self-expression is a visual expression that is felt, creates new artistic and imaginative reactions, and needs a learning path for expression and mastery. The use of VR in art therapy was identified as positive emotions, play and exploration, learning and mastery, access and storage. VR also has a potential to enhance psychological mental health and well-being by encouraging creation, thinking, interaction, and problem-solving (Kaimal et al., 2020).

Therefore, this paper will focus on the students at Universiti Sains Malaysia, Pulau Pinang, aged 18-24. This study needs to be focused on the university students' well-being and mental health. According to Intan Nurhaila et al., (2011); and Sohana Abdul Hamid, (2019), they are met with a new challenge in university life: making independent decisions about their lives and studies, adapting to academic demands, and engaging with a broad group of new people. Meanwhile, research by Muhammad Wafi Ramli & Sharifah Rohayah Sheikh Dawood, (2020) has suggested that the university should implement a holistic stress management and prevention program or intervention to reduce student stress problems. According to WHO, (2017), mental health disorders are expected to increase, which is depression will be the world's second-leading cause of disability by 2020 and will be the world's largest cause of disability by 2030. Consequently, this study address two research questions: Firstly, what are the types of existing artwork that Pusat Sejahtera has used? Secondly, what are the types of prototype media arts-based interventions in Pusat Sejahtera?

LITERATURE REVIEW

Art-Based Intervention

Art for health and well-being may be seen as a preventative measure, and the fundamentals of wellness are identifying and supporting individual resources. It can be seen in the previous study that using art as an intervention affects well-being and mental health.

Arts-based approaches help youth recognise and express their emotions. According to Coholic et al. (2020), arts-based activities are enjoyable, calming, entertaining, and beneficial to the youth. Arts-based activities can "get things out" in ways verbal communication does not. Using creative techniques with youth to improve communication and engage youth, particularly in group work, has long been recognised among the helping professions. According to youth feedback, arts-based activities may enhance self-esteem and resilience in teenagers, and even short-term treatments can promote stability.

In the study by Mak & Fancourt (2019), the researchers investigated the connection between arts engagement, such as listening to or playing music, sketching, painting, or creating things, and reading for pleasure, and children's self-esteem at the age of 11. Surprisingly, the study found that the relationship between children's participation in painting, sketching or creating things and their self-esteem did not differ significantly depending on parental involvement in these activities. One potential reason for this is that activities involving the creation of new arts, whether or not they are done with parents, may help individuals feel distinctive and therefore nurture their self-esteem.

Art and Healthcare Environment

Ulrich et al. (2003) compared the impact of natural circumstances with other conditions on individuals enduring a stressful operation (blood donation) in a US hospital, using physiological indicators such as blood pressure and pulse rate, as well as psychological self-report measures. According to the research, stress levels were shown to be greater during times of exposure to urban surroundings, including television. On the other hand, nature visuals and sounds were linked to decreased stress levels.

Meanwhile, National Arts & Health Framework (2013); Staricoff (2004) have described this area as any actions aimed at improving individual and community health, health promotion, and healthcare via the supply of artworks or performances, or attempt to improve the healthcare environment by the provision of artworks or performances.

Media Arts

Chen et al. (2020) pointed out that interactive art is a participatory art form based on computer technology, sensor technology, and human-computer interaction technology that would likely utilise AI as the primary medium and efficient instruments for production. Additionally, Chen et al. (2020) stated that interactive design needs a design motive that connects with the user's psyche and encourages the user to behave impulsively. Additionally, interactive design requires a layered interactive language that elicits users' primal urge to use, thus increasing users' desire to explore and engage.

Research from Hacmun et al. (2021) has shown that Virtual Reality (VR), in recent advances, technology-enabled the creation of immersive digital environments. This research included seven experienced art therapists who experimented with generating visual art in VR and participating as observers. This research is a qualitative study that involves a semi-structured interview and is analysed using Thematic Analysis. The results led to the following four major themes: 1) The user experience of creation in VR. 2) The qualities of the VR material and medium. 3) The VR environment as a therapeutic setting. 4) The relevance of the VR medium for art therapy.

RESEARCH METHODOLOGY

Research Design

This study used a qualitative approach involving data collection through both primary and secondary methods.

Participants

Participants included from a range of professional backgrounds including doctors, experts in fields: media arts, new media artists, sound arts and industry experts.

Eligibility criteria doctor:

- Director of Pusat Sejahtera and the medical staff
- Have worked in Pusat Sejahtera for more than five years.
- Community members in Corporate Image Communities for Pusat Sejahtera
- Person in charge in selection of artwork

Eligibility criteria experts in fields:

- Experience more than ten years
- Have knowledge, skill and experience in a specific subject via practice and study.

This study has obtained approval from the Jawatankuasa Etika Penyelidikan Manusia USM (JEPeM) (USM/JEPeM/22060391). Participants in the study are required to sign a consent form for interviews, including recording for data collection purposes. The group consists of three doctors from Pusat Sejahtera, USM, and four experts, namely in media arts, new media artists, sound arts, and industry experts.

Data Analysis

The director of Pusat Sejahtera and the medical staff participated in semi-structured interviews. The interviews aimed to gather as much data as possible parallel with the first objective. Meanwhile, the observation will be carried out to capture and record visuals in the areas where the existing arts are placed. For the second objective, the purpose of the semi-structured interview is to involve the experts in forming the prototype based on the theory of evolutionary congruence, which is useful in understanding what kinds of art are beneficial in improving results. Experts should be involved at this stage because their knowledge will help strengthen the development of prototype media arts that include visual, interactive, and natural sound features suitable to Malaysian contexts. The interviews were transcribed verbatim and analysed using thematic analysis by (Braun & Clarke, 2006) using NVivo Version 12. According to Braun and Clarke (2006), thematic analysis is a technique for identifying, analysing, and reporting data patterns (themes), as well as organising and describing your data set in (rich) detail.

Addressing Clinical Needed

Pusat Sejahtera (Kesihatan & Pergigian) Universiti Sains Malaysia was formerly known as Pusat Kesihatan USM, established in 1969. It is in the C15 building of the Main Campus to provide specialised medical and dental services to students (Figure 1). The study area's specific location is in the pharmacy waiting area (Figure 2). The rationale behind this choice is the results of previous studies have not yet been conducted in institutional healthcare, especially in Malaysia. As suggested by the Director-General of Health, Datuk Dr Noor Hisham Abdullah future healthcare facility design goals need to be considered. One of the goals is a healing environment, including art and hospitality. Moreover, the study by Muhammad Wafi & Sharifah Rohayah (2020) suggested that the University should have a development program or intervention to prevent the problem from the early stage by identifying the cause of stress among the students. Hence, there is a possibility of obtaining all necessary and relevant data from Pusat Sejahtera (USM).



Figure 1. Location of Pusat Sejahtera, Universiti Sains Malaysia
(Source: Author's personal collection, 2023)



Figure 2. Waiting area pharmacy, Pusat Sejahtera, Universiti Sains Malaysia
(Source: Author's personal collection, 2023)

FINDINGS

Phase 1

For phase 1 the semi-structured interview was conducted with the Director of Pusat Sejahtera and the medical staff. They will be asked questions about their knowledge of the use of art in the healthcare environment, perceptions and reflections on the existing elements and characteristics of art intervention used at Pusat Sejahtera Universiti Sains Malaysia.

The results of the study from interviews with doctors indicate the main themes and sub-themes, which are presented in Table 1.

Table 1. Themes and subthemes from interviews with doctors

Theme	Subthemes
	Existing artwork in Pusat Sejahtera
Impact on existing artworks in Pusat Sejahtera	Positive perceptions of the existing artwork
	Lack of appropriate guidelines for art selection and placement
More research on arts-based intervention	Up to date arts-based intervention
	More empirical findings on arts-based intervention

Theme 1- Impact on existing artworks in Pusat Sejahtera

These themes are highlighted from interviews with doctors about their opinions and thoughts on the existing artwork in Pusat Sejahtera. Two sub themes highlight the characteristics of existing artwork that has been used until now in Pusat Sejahtera. The second sub theme describes positive perceptions of the existing artwork as an art-based intervention.

Existing artwork in Pusat Sejahtera

The healthcare staff have limited experience and knowledge of the use of the arts in the healthcare environment. The lack of exposure to the role of art in healthcare will impact well-being and mental

health. The existing artwork in Pusat Sejahtera is considered too old, and the images are not appropriate for use. This is further supported by the outcomes of the interview carried out with the doctors at Pusat Sejahtera:

"...we only display works, but not artworks, more towards images... or more towards health education...." [DR 1]

I don't know whether you consider it art or not. We have something near the path, but it's simple artwork. it's recycled stuff. It's sustainable, but it's old. A few years ago, staff at Pusat Sejahtera made stuff—disposable items. [DR2]

In Pusat Sejahtera, I saw that there are mostly pictures on the wall, like those with abstract paintings, as well as pictures from photography, and then there are also drawings from the USM kindergarten collection. [DR3]

Positive perceptions of the existing artwork

Based on the interviews, the doctor has an opinion that the placement of existing artworks in Pusat Sejahtera is part of the arts-based intervention. This is because they thought that the artwork could have a positive impact on the healing and therapeutic processes.

As we know, no matter where we work, there must be stress. Even if we are close to the clinic, we have stress too. Even if a patient has already experienced stress due to pain, Pusat Sejahtera's artworks aim to alleviate some of this stress for both patients and staff. [D1]

To me, yes. To some extent, this existing artwork helps in terms of well-being and mental health [D2]

I would say both. As I mentioned earlier, artwork at Pusat Sejahtera serves two distinct roles: one is decorative or aesthetic, while the other is informative or educational. This could mean two things. It can be just a decoration, but it also functions for information. Additionally, when used as a decoration, it can indirectly have a therapeutic effect.[DR3]

Theme 2- More research on arts-based intervention

These themes highlight the need for and importance of doing more research on arts-based interventions in healthcare, especially in Malaysia. Three sub themes highlight the lack of appropriate guidelines for art selection and placement. The second subtheme necessitated the development of a new arts-based intervention that integrated both art and technology. Therefore, with the development of arts-based intervention, it became important to distinguish arts-based intervention from art therapy. This intervention is not considered 'art therapy' due to the absence of a formal psychotherapy framework and trained art therapists. It is important to do more research related to these.

Lack of appropriate guidelines for art selection and placement

The use of art intervention in Pusat Sejahtera is still not widespread and also lacks exposure in terms of specific visual elements in the healthcare environment, which include: the use of appropriate arts,

images, colours, artworks, paintings, or murals on walls because the result from the interview that was conducted there are no specific guidelines, they can follow for art selection and art placement.

We really don't have specific guidelines; for example, how big is this? How small is it? or "Difference types. All this time, we didn't think about the need for guidelines.[DR1]

"I don't think there are any guidelines for selecting these works... but I think any decision must be made in a meeting..." [DR 2]

To be honest, we don't have very specific guidelines for choosing works of art to exhibit at Pusat Sejahtera. [DR3]

Most of the paintings in Pusat Sejahtera, Universiti Sains Malaysia, Pulau Pinang are borrowed from Muzium & Galleri Tunku Fauziah and also collections of artworks by kindergartens at Universiti Sains Malaysia, Pulau Pinang (Figure 3).



Figure 3. Collection Artwork in Pusat Sejahtera, Universiti Sains Malaysia
(Source: Author's personal collection, 2023)

Up-to-date arts-based intervention

Integrated arts and technology are becoming increasingly popular in the digital world. Nowadays, people tend to explore technology more than ever before. Integrating art and technology into the new prototype enhanced the patient experience, enjoyable experience, improved the pleasantness of the healthcare environment, and increased the productivity and well-being of healthcare staff.

With the presence of new artworks other than the current ones, such as visual nature combined with the sounds of birds, you can feel that this innovation has already had a great impact on our patients.[DR1]

Most of the artwork in Pusat Sejahtera has been around for quite some time, so at one point maybe our brains were a bit used to it, so it might need some new stimulation. [DR2]

Our brains are always attracted to something new. stimulation with media intervention, for example... with artworks that are interactive by combining hearing with visuals, of course it will be more appealing towards staff, towards patients, and towards visitors... it may even be more helpful in the well-being process with sounds and visuals that are soothing. [DR3]

More empirical findings on arts-based intervention

Based on the interviews, there is a gap of knowledge and literature review on the topic of arts-based intervention in the healthcare environment. This is further supported by the outcomes of the interview carried out with the doctors at Pusat Sejahtera:

There has never been a single study or anything that we have done regarding this matter. I think it's something that we haven't been part of. [DR1]

I think we should be doing it, really, because we don't know whether the work we are doing is an intervention or just because we think of it as a platform to fill the walls or empty spaces in the health facility. [DR1]

DESIGNING PROTOTYPE

Forming Prototype

The prototype of media arts will be created or produced using a combination of art and technology. These include interactive art, sound art, visual, and computer art. In forming the prototype researcher found that in the theory of evolutionary congruence by Ulrich and Gilpin (2003), is valuable for comprehending which forms of art are advantageous for enhancing outcomes. According to this theory, the act of viewing nature-inspired artwork can induce a state of calmness, reduce stress, and contribute to positive well-being. Based on this theory, the presence of certain features and properties can facilitate the restoration of diverse groups of people. These include calm or slowly flowing water, lush greenery, blooming flowers, open spaces in the foreground, park-like or savannah-like characteristics (such as scattered trees and grassy understory), and the presence of non-threatening wildlife such as birds.

According to Lane, (2005), have stated that “*When the brain perceives a picture of a peaceful landscape or participates in creative activities, it causes parasympathetic arousal. The heart rate decelerates, blood pressure decreases, respiration rate lowers, blood flow redirects towards the intestines, and the body shifts into a state of deep relaxation*”.

In previous research, Mohammad Kamal et al. (2018) focused on sound art as an intervention for art therapy for Alzheimer's patients. In this research, the prototype of sound art has been explored by listening to sound art in a natural setting. Sound nature will be created to provide more soothing, stress-relieving, and relaxing effects. Based on previous research, natural sound is an interdisciplinary art form with much potential for use in public areas, particularly in healthcare settings.

According to the article written by Zeldenrust, (2022), exposure to natural sounds can induce a tranquil and restorative impact on the mind and body. The tranquil sounds of a flowing brook, the gradual swaying of foliage in the breeze, or the melodious trills of avian creatures can elicit a feeling of serenity and a profound bond with the environment. Previous studies have demonstrated that being exposed to natural sounds may successfully reduce stress, decrease blood pressure, and enhance both mood and cognitive function.

FINDINGS

Phase 2

For phase 2 the semi-structured interview was conducted with experts in the field to enhance the design and engage them in the development of the prototype. The interview's findings indicate that the use of visual nature and natural sound produces a calming, stress-reducing, and tranquilising effect.

The results of the study from interviews with experts indicate the main themes and sub-themes, which are presented in Table 2.

Table 2. Themes and subthemes from interviews with experts

Theme	Subthemes
	Appropriate visual nature in the healthcare environment
Incorporating visual nature and nature sound in the healthcare environment	Appropriate natural sound in the healthcare environment
	Art and technology integration
Innovative integration of art and technology	Novelty and innovation

Theme 1- Incorporating visual nature and nature sound in the healthcare environment

These themes are highlighted from interviews with experts about their opinions, thoughts and knowledge based on their expertise and experience on new media arts. Two sub themes highlight the use of visual nature as a key element in the prototype. The second subthemes the use of natural sounds in the healthcare environment.

Appropriate visual nature in the healthcare environment

By integrating nature as the key element with local elements, there is the potential to create an immersive natural experience, providing appropriate content for patients, visitors, and healthcare staff in promoting calmness, reducing stress and promoting good health.

At least with the presence of local elements such as the lake and the beach with a clean and wide view, as well as the sound of birds and water, you can feel the peace there. [E3]

In my opinion, when we discuss a subject, we often gravitate towards nature because it contrasts with man-made structures. So, we can talk about nature because it does give peace regardless of age. [E2]

the approach of art and technology is something new and I think it can be successful if we create the best scene of nature that is suitable for the Malaysian environment. [E1]

What I saw was the most visual in Japan and Malaysia, with elements such as the blue sea, plants, music, sound, landscape, scenery, forest, and sky. I believe it is a pre-visualization of the universe because we cannot photograph it. They are animals, landscapes, characters, animations, motion graphics, combinations, flowers, and abstracts. [E4]

Appropriate natural sound in the healthcare environment

Exploring elements for appropriate sound, including the integration of natural sounds in healthcare, emphasises the significance of rhythm and tempo in enhancing the auditory environment.

For sound, ambient, and natural sound from the animals, you can use both or combine them. [E4]

Of course, if we want to have a very typical sound from nature, I think it's good because we're at this hospital and we know the sound all kinds of machinery from the hospital. Generally, the sound of nature has the potential to counterbalance these external noises. [E2]

For sound, I think is better to use natural sound... it's more calming inside. For example, use the sound of birds, and so on and so on. And then the sea, there is the sound of waves. And then the waterfall, the sound of the waterfall. [E1]

Tranquillity, if you want something calm, then the rhythm has to be the same as BP. Rhythm, meaning beat or tempo, is the same as the heart. So, it's a normal beat, and then there aren't many pitch notes that run high and low. [E3]

Theme 2- Innovative integration of art and technology

These themes have highlighted the benefits of integrating art and technology in healthcare and the ability to enhance patient experience, comfort, and enjoyment. Two sub themes highlight the combination of art and technology in making arts. The second subthemes the novelty and innovation of new media arts in healthcare.

Art and technology

The potential integration of art and technology encourages engagement with the digital world.

In my opinion, new media holds greater potential. Even now, I think even in healthcare, many people have put up TV screens, replacing those old posters. Screening is more high-end healthcare. So, for me, it's an opportunity to enter more new media. [E2]

My opinion is the combination of art and technology nowadays it's encouraging because we are moving towards to digital world. [E1]

Novelty and innovation

By combining art and technology, creating a new novelty prototype as an arts-based intervention in healthcare environments may create immersive and engaging spaces that encourage healing, decrease stress, and enhance general well-being.

Usually, we only see paintings or conventional art depicting beautiful scenery, which instils a sense of calm in patients or even healthcare staff. Therefore, I believe it's a good idea to propose the creation of a prototype that combines art and technology, as no healthcare, hospital, or care centre in Malaysia currently features such technology-integrated artwork. [E3]

So, for me, it is a good suggestion and idea to do this prototype. I haven't seen any healthcare that used media art, interactive art, or immersive art in healthcare before. [E1]

TECHNOLOGIES

The development of the prototype involved several elements of software and hardware. The software involved in interaction and gesture user movement was created using Microsoft Xbox Kinect 2.0 depth sensor technology for motion recognition. The animated and graphic 3D visual experience was created using the Unity 3D game engine, and the programming language used was C# to develop interactivity coding for the interaction element in the prototype. The installation hardware includes a projector with installation on the ceiling, an MSI laptop, Kinect 2.0, two pairs of speakers, and an amplifier for immersive experiences (Figure 4).



Figure 4. Prototype Setting
(Source: Author's personal collection, 2023)

DISCUSSION

Objective 1: To identify the existing elements and characteristics of the artworks in the healthcare environment

The first objective of the study, aimed to identify the existing elements and characteristics of the artworks in the healthcare environment. Through the analysis of semi-structured interviews, several key themes emerged that can provide clear pictures of the need for new arts-based intervention and more empirical findings on arts-based intervention in the healthcare environment. In this study, findings revealed that the integration of arts in healthcare is a lack of exposure, experience, and knowledge of the use of the arts in the healthcare environment. The existing artworks are older pieces, and there are no appropriate guidelines for art selection and placement in healthcare. As can be observed, there has been a lack of updates to introduce newer artwork that could enhance the patient experience, create a more

pleasant environment, and boost the productivity of healthcare staff in healthcare facilities. Previous study has shown that the main priority of integrating art into the healthcare environment is enhancement of patients' well-being through the art selection and placement of artwork that enhances and contributes to a pleasant environment (Nurhaya & Ain Farhana, 2020).

Objective 2: To propose a prototype media art as a new art-based intervention to enhance a pleasant healthcare environment

The second objective of the study is to propose a prototype media art as a new art-based intervention to enhance the pleasant healthcare environment and potentially promote well-being and mental health among students in institutional healthcare settings. Through an analysis of experts' knowledge and experience with new media arts, themes such as "*innovative integration of art and technology*" and "*incorporating visual nature and natural sounds in the healthcare environment*" emerged. The findings indicate that the use of appropriate visual nature and natural sound had a calming impact, reducing stress and soothing patients, visitors, and healthcare staff, thus enhancing psychological well-being. Previous research has shown that viewing nature artworks increased stimulation and decreased sleepiness after stress compared to viewing jumbled pictures (Law et al., 2020). Experts view the integration of art and technology in the healthcare environment as a promising strategy to adapt to the digital era, reducing discomfort during the waiting period for treatment and offering positive distractions. The development of prototype media arts that include visual, interactive, and natural sound features suitable to Malaysian contexts.

The findings from both objective of the study highlight the importance of integrated art and technology, incorporation of visual nature and natural sound, and the appropriateness of art selection and placement is a promoting holistic approach that combine art, technology and natural elements to enhancing pleasant environment and promoting positive well-being and mental among patients, visitors and healthcare staff.

CONCLUSION

In conclusion, the prototype is an interactive work thoughtfully illustrated to immerse users in an animated mountain meadow scene and sky. In the space, users can play and interact with butterflies by using hand and body motion gestures to control the butterflies' motion. For the user, perhaps sitting quietly and enjoying the natural sounds and visuals. Engagement with the prototype user expresses interest in and engagement with interactive prototypes, indicating a potential for interactive technologies to enhance waiting experiences. The future recommendation is to foster collaborations between artists, healthcare professionals, and researchers to create interdisciplinary teams that can develop and implement media art interventions. This collaboration will ensure that interventions are both scientifically grounded and artistically meaningful.

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A Conceptual Framework for Integrating Mental Rotation and 3D Animation Pedagogy

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ABSTRACT

This conceptual paper introduces a framework exploring the emotive dimensions of spatial learning in college students, employing a quantitative research approach. Integrating the mental rotation method with 3D animation pedagogy, the research aims to elucidate the interplay between emotional learning and spatial visualization enhancement. Quantitative data analysis includes descriptive statistics, independent samples t-tests, and analysis of variance (ANOVA). The framework proposes that this combination can evoke positive emotions, such as engagement and enjoyment, contributing to a more effective spatial learning experience. Findings emphasize the mediating role of emotional engagement in the relationship between pedagogical methods and spatial learning outcomes. Educators are encouraged to consider students' emotional responses, recognizing the potential of positive emotions to enhance mental rotation training within the context of 3D animation. In conclusion, this conceptual framework provides a foundation for further research and practical applications, aiming to optimize spatial learning outcomes in college students.

Keywords: *3D animation pedagogy, Spatial learning, Mental rotation, Learn emotions*

INTRODUCTION

In the domain of higher education, spatial learning has gained prominence for its impact on cognitive development and academic achievement across various disciplines. Spatial skills, including mental rotation and 3D visualization, are recognized as pivotal in fields such as STEM, architecture, and the arts (Lochhead et al., 2022).

Emotions play a crucial role in shaping the learning experience, influencing cognition, motivation, and academic outcomes (Robina-Ramírez et al., 2020). In higher education, understanding the intricate interplay between emotions and spatial learning is essential for designing effective pedagogical strategies (Hill et al., 2021). Embracing emotive dimensions like engagement and enjoyment provides a nuanced perspective for creating resonant educational experiences.

Despite the recognized importance of spatial learning and emotions in education, there exists a noticeable gap in comprehensively understanding their synergistic relationship within higher education settings (Abuhassna et al., 2024). Specifically, this gap emerges within the context of STEM (Science, technology, engineering and art design) education at the university level, where the integration of spatial learning strategies and emotional engagement is crucial for effective learning outcomes (Martin & Borup, 2022). Existing research often segregates spatial learning and emotional engagement, limiting our understanding of their combined impact on educational outcomes (Bai et al., 2020). This study aims to bridge this gap by exploring the integration of mental rotation training and 3D animation pedagogy, with a focus on emotions as a central mediating variable.

The primary objective is to develop a conceptual framework that integrates mental rotation training and 3D animation pedagogy within the context of spatial learning for college students. This framework conceptualizes emotions as a central mediating variable, investigating how emotional engagement influences the efficacy of mental rotation training. By addressing this research gap, the study aims to provide a theoretical structure that enhances our understanding of spatial learning in higher education. The insights derived from this conceptual framework will be valuable for educators, researchers, and policymakers interested in optimizing spatial learning strategies in higher education.

Through this conceptual lens, the study contributes to the theoretical discourse on spatial cognition and emotional learning in the context of higher education. Theoretical perspectives on spatial cognition and emotional learning are integrated to form a comprehensive framework, offering a novel approach to understanding and enhancing spatial learning experiences for college students.

LITERATURE REVIEW

Spatial learning, encompassing mental rotation skills and 3D visualization, has emerged as a critical facet of cognitive development within higher education (Radianti et al., 2020). As educators seek innovative pedagogical approaches to enhance spatial understanding among college students, the integration of mental rotation training and 3D animation pedagogy has gained prominence (Piri & Cagiltay, 2023). This literature review navigates through existing research to shed light on the theoretical foundations and empirical evidence surrounding spatial learning, emphasizing the interplay between cognitive processes and emotional dimensions. The integration of mental rotation exercises and 3D animation in educational settings forms the focal point, exploring their combined impact on spatial visualization abilities. Through a critical examination of current studies, this literature review aims to discern gaps, trends, and theoretical frameworks, setting the stage for the proposed research focused on optimizing spatial learning experiences.

Overview of Spatial Learning Theories and Current Landscape

Spatial learning theories serve as the bedrock for comprehending the mechanisms through which individuals acquire, process, and apply spatial information. Beginning with Piaget's groundbreaking contributions and extending to contemporary cognitive theories, an exploration of spatial learning theories offers profound insights into the cognitive processes that underlie spatial reasoning (Holland, 2019).

Piaget's theory of cognitive development laid the foundation for understanding how spatial thinking evolves throughout childhood. His stages of cognitive development proposed that as children mature, their ability to grasp and manipulate spatial concepts progresses. However, it is crucial to note that Piaget's model has faced critique and refinement over time, with scholars suggesting modifications to better align with empirical evidence and diverse populations (Oogarah-Pratap et al., 2020).

Table 1. Piaget's theory of cognitive development

Stage	Age	Goal
Sensorimotor	Birth to 18-24 months	Object permanence
Preoperational	2 to 7 years old	Symbolic thought
Concrete operational	Ages 7 to 11 years	Logical thought
Formal operational	Adolescence to adulthood	Scientific reasoning

(Source: Oogarah-Pratap et al., 2020))

Piaget's theory primarily focuses on cognitive development, but it is important to recognize that emotions also play a crucial role in children's learning (Berk, 2023). Emotions can influence how children perceive, process, and remember information, as well as their motivation and engagement in learning tasks.

For children with emotional or behavioral challenges, the impact of emotions on learning can be particularly significant (Santrock, 2023). These children may experience anxiety, frustration, or disengagement in learning situations, which can hinder their academic progress.

Therefore, it is essential for educators and caregivers to create emotionally supportive learning environments that address the needs of all children (Levine et al., 2019). This may involve providing individualized support, fostering positive relationships, and promoting strategies for managing emotions.

Building on Piaget's work, more recent cognitive theories delve into the intricate processes of spatial learning. The embodied cognition perspective, for example, posits that sensorimotor experiences shape the development of spatial understanding. Additionally, the dynamic spatial imagery theory emphasizes the dynamic mental manipulation of spatial representations (Palmiero et al., 2019). Such contemporary perspectives contribute to a nuanced understanding of the cognitive mechanisms involved in spatial learning.

The interdisciplinary nature of spatial learning is evident in its relevance across diverse academic domains in higher education. In STEM fields, spatial thinking is integral to problem-solving and understanding complex structures (Atit et al., 2020). Moreover, spatial skills play a crucial role in disciplines such as architecture, geography, and the arts (Ergen, 2021). This interdisciplinary aspect

underscores the universality of spatial learning theories, emphasizing their application beyond specific domains.

In conclusion, a comprehensive exploration of spatial learning theories, from Piaget to contemporary cognitive perspectives, provides a robust foundation for understanding the cognitive processes underpinning spatial reasoning. The interdisciplinary relevance of spatial learning across various academic domains in higher education underscores its universal importance. Moreover, the role of emotions in spatial learning cannot be overlooked.

Mental Rotation

Mental rotation, a fundamental cognitive process, involves the internal manipulation and rotation of spatial representations, playing a pivotal role in spatial learning. The proficiency in mental rotation skills significantly contributes to an individual's ability to comprehend and navigate spatial information, making it a crucial aspect of cognitive development and educational contexts (Città et al., 2019).

The field of mental rotation research offers a wealth of knowledge about its applications and impact on spatial cognition. Pioneering studies established mental rotation's significance in cognitive development, demonstrating its involvement in tasks like spatial visualization and problem-solving (Kozhevnikov & Hegarty, 2021). Building upon this foundation, recent research has explored individual differences in mental rotation abilities. This line of inquiry sheds light on the variability in how people perform and learn spatial tasks (Liu et al., 2019).

Mental rotation skills are essential not only for spatial cognition but also for success in various academic disciplines. In STEM fields, for instance, the ability to mentally rotate objects is crucial for visualizing complex structures and solving spatial problems (Kadam et al., 2021). Furthermore, mental rotation extends beyond traditional spatial tasks like object manipulation. Research suggests its involvement in understanding abstract concepts in mathematics and even language processing. Mental rotation tasks have been used to investigate how individuals represent and manipulate numerical concepts. For example, studies show a correlation between mental rotation ability and performance in tasks involving mental number lines, where numbers are visualized on a spatial line increasing or decreasing in value (Moen et al., 2020). Mental rotation might be involved in processing certain metaphors or idioms. For instance, understanding the phrase "grasp a concept" could involve mentally rotating an abstract concept to a more concrete, manipulable object (Suggate et al., 2019).

The integration of mental rotation within educational contexts has garnered attention as educators seek to optimize spatial learning strategies. Virtual environments and educational technologies leveraging mental rotation tasks have been developed to enhance spatial learning outcomes (Höffler et al., 2017). These interventions aim to capitalize on the cognitive benefits of mental rotation, providing interactive and engaging platforms for learners.

In conclusion, the literature on mental rotation offers a comprehensive understanding of its applications and effects on spatial cognition. From foundational studies highlighting its role in cognitive development to contemporary research exploring individual differences, the evolving landscape of mental rotation research contributes significantly to our understanding of spatial learning. As educators continue to recognize its importance, the integration of mental rotation within educational technologies holds promise for optimizing spatial learning experiences.

Theoretical Foundations of Learning Emotions

Learning emotions theory posits that emotions play a pivotal role in the learning process, exerting significant influence on cognitive functions, motivation, and overall academic performance. This theoretical framework, rooted in psychological and educational research, delves into the complex interplay between emotions and learning outcomes, contributing to a more comprehensive understanding of the educational experience (Hartikainen et al., 2019).

Research has consistently highlighted the impact of emotions on various aspects of learning. Pekrun et al. (2011) emphasized the multifaceted nature of academic emotions, including enjoyment, boredom, and anxiety, and their implications for student engagement and achievement. Understanding the emotional experiences of learners is crucial for educators in tailoring instructional strategies that cater to the diverse emotional landscape within the classroom (Pekrun et al., 2023).

The relationship between emotions and cognitive functions is well-established in the literature. Positive emotions, such as enjoyment, have been linked to enhanced cognitive processing and improved academic performance (MacCann et al., 2020). Conversely, negative emotions, like anxiety, can impede cognitive functions and hinder effective learning. Recognizing these dynamics allows educators to implement interventions that foster a positive emotional climate conducive to learning.

Motivation, a key component of the learning process, is intricately connected to emotions. Schutz and Pekrun proposed a control-value theory of achievement emotions, suggesting that students' perceptions of control and value in academic tasks influence their emotional responses (Camacho-Morles et al., 2021). Motivational factors, intertwined with emotions, significantly impact the effort and persistence students invest in their learning endeavors.

The educational implications of learning emotions theory extend beyond the classroom. Pekrun highlighted the role of teachers and instructional design in creating emotionally supportive learning environments. By acknowledging and addressing students' emotional experiences, educators can promote positive emotional states that enhance learning engagement and outcomes (Pekrun et al., 2023).

Furthermore, recent advances in educational technology have explored the integration of emotional recognition systems and affective computing to gauge and respond to students' emotional states in real-time (Aslan et al., 2019). These technological interventions offer innovative ways to tailor educational experiences based on the emotional needs of individual learners.

Learning emotions theory provides a valuable framework for understanding the complex interplay between emotions and learning. Emotions can significantly impact cognitive functions, motivation, and academic performance. By recognizing these influences, educators can cultivate emotionally supportive learning environments and tailor instructional strategies to optimize student engagement and learning outcomes.

Applications and Impacts of 3D Animation Pedagogy in Spatial Learning

The combination of mental rotation training with 3D animation pedagogy represents a novel approach to enhancing spatial learning. By blending cognitive exercises with immersive visualizations, this integration aims to capitalize on the synergies between mental rotation skills and the dynamic nature of 3D animation. This section explores the theoretical underpinnings and potential benefits of merging these two pedagogical approaches (Zhou et al., 2022).

The application of 3D animation pedagogy in spatial learning is a burgeoning area of research. From virtual simulations to interactive modeling, 3D animation techniques offer innovative avenues for spatial education. This section reviews current literature to delineate the applications and impacts of 3D animation pedagogy in the context of spatial learning, elucidating its role in shaping cognitive processes and learning outcomes (Haghanikar, 2019).

In summary, the literature review synthesizes current knowledge on spatial learning theories, learning emotions, mental rotation, and 3D animation pedagogy. This comprehensive exploration sets the stage for the subsequent development of the conceptual framework, providing a robust theoretical foundation for the integration of these elements in the context of higher education.

DEVELOPMENT OF THE CONCEPTUAL FRAMEWORK

In forging the conceptual framework, integration of cognitive theories pivotal to spatial learning lays the groundwork, drawing upon seminal concepts from cognitive psychology and spatial cognition literature. This synthesis forms a theoretical bedrock, elucidating the intricacies of how individuals acquire and process spatial information in educational contexts (He et al., 2021).

Extending beyond this cognitive foundation, the framework incorporates pertinent emotion theories relevant to the educational milieu. Acknowledging the profound impact of emotions on learning, particularly within spatial contexts, facilitates a comprehensive understanding of how emotional dimensions intricately mold cognitive processes, consequently shaping spatial learning outcomes (Barrett & Westlin, 2021).

At its core, the framework innovatively integrates mental rotation training and 3D animation pedagogy. Articulating the rationale behind this amalgamation underscores their potential synergies and complementary roles in enriching spatial learning experiences for college students (Höffler et al., 2017). Fundamental principles guiding the symbiotic interaction between mental rotation and 3D animation pedagogy are illuminated within the framework. This section delves into how mental rotation exercises, within the immersive context of 3D animation, leverage cognitive and immersive aspects, fostering an enriched learning environment.

The framework ventures into uncharted territory by introducing hypotheses concerning the presumed benefits of this integrated approach on spatial learning outcomes. These hypotheses are deeply rooted in the anticipation that the combined forces of mental rotation and 3D animation pedagogy will propel enhanced spatial visualization abilities and heightened problem-solving acumen among college students (Namukasa et al., 2023). In acknowledging the emotive dimensions, the framework identifies key emotions such as engagement and enjoyment as pivotal components influencing the efficacy of spatial learning strategies. This section artfully delineates the instrumental role these emotions play in shaping students' cognitive engagement with spatial tasks.

Moreover, the conceptual framework boldly proposes emotional learning as a mediating factor between the integrated methodologies and spatial learning outcomes. This daring assertion posits that positive emotional experiences, cultivated by the amalgamated approach, intricately mediate the relationship between instructional methods and the cognitive development of spatial skills (Ndofirepi, 2020). The theoretical conceptual framework is summarized in the accompanying table, providing a visual representation of the integration of cognitive and emotion theories, the combination of mental rotation and 3D animation pedagogy, and the assumed impact on spatial learning outcomes.

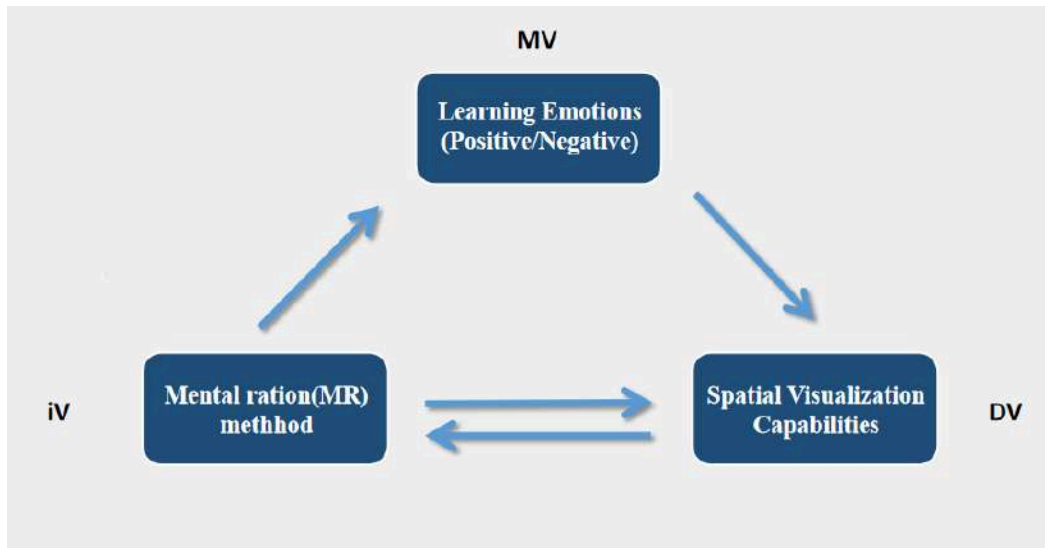


Figure 1. Theoretical conceptual framework

(Source: Author)

In summary, the conceptual framework unifies cognitive and emotion theories, integrates mental rotation with 3D animation pedagogy, outlines principles of interaction, proposes hypotheses on spatial learning benefits, identifies key emotions, and introduces emotional learning as a mediating factor. The accompanying table provides a visual representation of the theoretical framework's key components.

RESEARCH METHODOLOGY

This study employs a quantitative research design specifically utilizing an experimental approach. This methodology allows for a systematic examination of the causal relationship between the Mental Rotation (MR) approach, mood, and spatial visualization ability. The aim is to provide empirical evidence for the effects of mental rotation methods on students' emotional and spatial visualization skills.

The initial phase of the research involves testing the proposed theoretical framework. This process aims to validate the integrated concepts, ensuring that the cognitive and emotional dimensions, along with the combined use of mental rotation and 3D animation pedagogy, align coherently. The following table outlines the steps involved in the theoretical framework testing process.

Table 2. Experiment process

Step	Activity
1	Conduct pre-testing on participants.
2	Participants are divided into two groups based on their pre-test scores: one group receives the intervention, while the other continues with regular learning activities.
3	Design and administer spatial learning tasks

4	Implement mental rotation training exercises
5	Collect participant feedback on emotional experiences during the learning activities
6	Conduct post-testing on participants
7	Validate the theoretical framework
8	Analyze and interpret results
9	Refine theoretical framework if necessary

(Source: Author)

The experimental intervention spanned two weeks, with no disruption to participants' daily study routines, including weekend breaks. The specific experimental process is shown in Table 2. Participants in this study underwent a comprehensive testing process to evaluate their spatial learning abilities and emotional experiences. Pre-testing was conducted using established measures of spatial cognition. The Mental Rotation Test (MRT) (Hegarty & Waller, 2020) was used to assess participants' mental rotation abilities, while the Purdue Spatial Visualization Test–Revised (PSVT-R) (Kozhevnikov & Hegarty, 2021) measured their spatial visualization capabilities (see Tables 3 and 4).

Table 3. Mental Rotation Test (MRT) Testing Procedure

Step	Description
Presentation of stimuli	Participants are presented with pairs of two-dimensional images depicting objects from different angles.
Task	Participants are instructed to mentally rotate one of the images to match the orientation of the other.
Response recording	Participants provide their responses indicating whether the images are the same or different in orientation.
Scoring	Correctness of responses is scored, typically based on accuracy and speed of completion.

(Source: Hegarty & Waller, 2020)

Table 4. Purdue Spatial Visualization Test (PSVT) Testing Procedure

Step	Description
Presentation of stimuli	Participants are presented with sets of objects or shapes and asked to imagine how they would look if rotated.
Task	Participants manipulate mental representations of the objects to determine if certain views are possible.
Response recording	Participants provide their responses indicating whether certain views are possible or impossible.

Scoring	Correctness of responses is scored based on the accuracy of determining the possibility of specific views.
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(Source: Kozhevnikov & Hegarty, 2021)

Based on pre-test results, participants were then grouped to ensure homogeneity and optimized engagement. One group received the intervention, while the other continued with regular learning activities. Throughout the study, participants engaged in spatial learning tasks and mental rotation training exercises. To understand emotional experiences during these activities, concurrent qualitative data was collected through participant interviews (see Table 5). Following the learning activities, post-testing was conducted to measure any changes in participants' spatial abilities. The theoretical framework was rigorously validated, emphasizing its explanatory power for the observed phenomena. Finally, data analysis and interpretation were conducted, with potential refinements to the theoretical framework considered if necessary, ensuring a robust understanding of the emotions-spatial learning relationship.

Table 5. Interview Procedure for Collecting Emotional Experiences

Step	Description
Preparation	Determine the interview goals and questions.
	Prepare interview questions.
	Select appropriate interview participants.
	Schedule interviews and confirm locations.
Building rapport	Introduce yourself and the research purpose.
	Ensure the participant feels comfortable and relaxed.
	Explain the interview process and confidentiality principles.
Conducting the interview	Use open-ended questions to encourage participants to share their thoughts and feelings.
	Actively listen and maintain eye contact.
	Ask follow-up questions to obtain deeper insights.
Closing the interview	Thank the participant for their participation.
	Summarize the interview content.
	Answer any questions the participant may have.
Data analysis	Transcribe interview recordings or notes.
	Identify key themes and patterns in the interviews.
	Analyze the data and draw conclusions.

(Source: Author)

This structured testing process aims to provide empirical evidence regarding the effectiveness of the integrated theoretical framework, systematically evaluating both cognitive and emotional dimensions in the context of spatial learning in higher education.

Sample Selection

Sample selection is a pivotal aspect of the research methodology, crucial for ensuring the generalizability of findings. This study employs a systematic approach to participant selection, considering specific criteria to form a representative sample.

We recruited participants using a convenience sampling method, reaching out to students enrolled in the 3D Animation major at the Hebei Academy of Fine Arts, China, in 2023. Additionally, we distributed recruitment materials through campus flyers and various social media platforms. Exclusion criteria ensure the integrity of the sample by excluding individuals with diagnosed cognitive impairments or learning disabilities. Non-consenting participants are excluded, adhering to ethical standards. A total of 60 participants (30 males and 30 females) met the eligibility criteria and were included in the study. All participants aged between 18 and 25 years.

To ensure sample diversity, participants were recruited from various academic backgrounds, aiming to capture a broad spectrum of spatial learning experiences. Furthermore, we limited the age range to 18–25 years to maintain homogeneity within the college demographic.

Recruitment procedures involve reaching out to potential participants through official college communication channels. Transparent communication about the study's objectives and requirements is maintained, and informed consent is obtained from each participant. Sample size determination follows a statistical power analysis approach, balancing the need for statistical significance with practical feasibility. This ensures the study's ability to detect meaningful effects. Demographic information, including age, gender, academic major, and prior spatial learning experiences, is collected to facilitate subgroup analyses and explore potential variations within the sample. Participation in the study is entirely voluntary, and participants are informed of their right to withdraw at any stage without consequence. Confidentiality measures are implemented, with participant data anonymized during analysis to uphold ethical standards. By adhering to these rigorous sample selection criteria and processes, the study aims to assemble a diverse yet representative group of college students. This approach enhances the reliability and applicability of the research findings within the context of spatial learning in higher education.

Data Analysis

The primary statistical method employed in this study is Analysis of Variance (ANOVA), focusing on examining differences in means across multiple groups. This quantitative data analysis approach allows for a thorough exploration of the relationships within the dataset. This focused employment of ANOVA ensures a precise and targeted analysis, aligning with the study's objectives and emphasizing the impact of categorical factors on spatial learning outcomes.

In addition to the primary statistical method of Analysis of Variance (ANOVA), this study also utilized independent sample t-tests to further investigate specific pairwise differences in means between two distinct groups. The independent samples t-test is particularly valuable when comparing the means of two separate groups, allowing for a detailed examination of the differences between them.

At the end of the two-week experiment, the results of the spatial visualization test showed that the experimental group had significantly higher scores than the control group (see Table 6). Specifically, the mean score for the experimental group was 42.5 (SD = 3.2), whereas the mean score for the control group was 39.8 (SD = 2.9). An independent sample t-test revealed a statistically significant difference between the two groups ($t(58) = 2.67$, $p = 0.01$), indicating that the mental rotation training improved the participants' spatial visualization ability.

The results of the positive emotions questionnaire showed that the experimental group had significantly higher scores than the control group (see Table 6). Specifically, the mean score for the experimental group was 75.2 (SD = 5.3), whereas the mean score for the control group was 70.6 (SD = 4.8). An independent sample t-test revealed a statistically significant difference between the two groups

($t(58) = 2.11, p = 0.04$), suggesting that the mental rotation training increased the participants' positive emotions.

Table 6. Experimental result statistics

Group	Spatial visualization test	Positive emotions questionnaire
Experimental (n=30)	Mean= 42.5, SD = 3.2	Mean= 75.2, SD = 5.3
Control (n=30)	Mean= 39.8, SD = 2.9	Mean= 70.6, SD = 4.8
t-test results	($t(58) = 2.67, p = 0.01$)	($t(58) = 2.11, p = 0.04$)

(Source: Author)

Overall, these results underscore the beneficial effects of mental rotation training on both spatial learning abilities and emotional experiences, providing valuable insights into the potential of this approach for educational interventions.

CONCLUSION

In conclusion, our conceptual framework, which integrates mental rotation and 3D animation pedagogy while acknowledging emotive dimensions, demonstrates clear potential for enhancing spatial learning. Notably, the evident enhancement in spatial visualization abilities further reinforces the efficacy of our approach. By synthesizing cognitive and emotional theories, the framework enriches the learning experience and fosters enhanced spatial visualization abilities among college students.

This approach significantly contributes to spatial learning by acknowledging the pivotal role of emotional engagement in shaping cognitive outcomes. The incorporation of mental rotation and 3D animation pedagogy fosters a dynamic and engaging learning environment conducive to spatial skill development. However, while this approach holds promise for enhancing spatial learning across various educational domains, further research is warranted to explore its specific benefits and potential limitations within distinct disciplinary contexts. As researchers, we encourage educators to consider adopting these pedagogical methods, fostering positive emotional experiences alongside cognitive challenges. Practical implementation of the framework in classrooms has the potential to enhance spatial learning outcomes and contribute to overall cognitive development.

As education evolves, continued research is vital to validate and refine our conceptual framework. Future studies should explore long-term impacts, variations in student characteristics, and adaptations for diverse educational settings.

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Establishing Fashion Design Entrepreneurs' Management Competency in the Malaysian Fashion Landscape

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ABSTRACT

The achievements of Malaysian fashion designers have been fraught with success and failure. The intense competition in the fashion industry is one of the main obstacles for fashion designers who decide to venture into fashion entrepreneurship. This study seeks to understand what additional skills are necessary and how to face the challenges they encounter. The respondents in this study were fashion design entrepreneurs who participated in group discussions, and fashion experts who were interviewed. Throughout the entirety of the process of data collecting, a collection of standardised questionnaires was utilised in focus group discussions. As a consequence of the findings of the study, they are faced with the challenge of overcoming a variety of deficiencies, some of which include inadequate business management, inadequate financial management, inadequate management of human resources, and other deficiencies. Based on the findings, fashion experts who participated in this study have provided advice. As a result, this study can provide fashion design entrepreneurs with preventative business continuity and sustainability measures.

Keywords: *Fashion design entrepreneurship, Management skills, Fashion design management*

INTRODUCTION

Malaysian fashion designers are compelled to compete with entrepreneurs in the industry in order to retain and sustain their business and visibility, much as their internationally renowned counterparts. Vivy Yusuf, with her duCk and Lilit brands, and Neelofa for Nelofar are two names that dominate modest fashion in the Malaysian fashion industry. It was thought to be another fashion movement associated with Muslims, and it combined religious symbolism, contemporary fashion trends in mainstream apparel labels, and local brand development marketing tactics centred on the Muslim population (Zulina & Nazlina, 2020). It appears that the company's strategy of using social media to interact with its audience has helped increase sales (Nor Hasliza & Zulnaidi, 2021). Nevertheless, a great number of fashion

designers who have been operating in the fashion industry still require assistance for the continuity of their business.

Fashion designers who are involved in all stages of garment production and product development, as well as marketing and sales, can be classified as fashion design entrepreneurs (Benson & Sanders, 2017). Fernandes (2019) argues that fashion design entrepreneurs struggle to maintain a stable business while the fashion industry evolves swiftly in response to shifting consumer tastes. This research aims to understand better the challenges fashion design entrepreneurs face in Malaysia. This study also seeks to identify the skills and expertise fashion design entrepreneurs require to be successful in the fashion industry, as well as the solutions that may be developed to aid fashion design entrepreneurs in sustaining their enterprises. The acquired results will immediately contribute to the development of a solution presented as a framework to aid fashion design entrepreneurs in enhancing their chances of survival in the fiercely competitive fashion business.

Fashion design entrepreneurs are synonymous with the Malaysian fashion industry due to their innovative approach to fashion design and contribution to the local fashion landscape. The growth of numerous local fashion labels affects the brand names of fashion designers in this business rivalry. It is difficult for many fashion designers to increase their consumer base and, consequently, their revenue due to the ongoing increase in competition among fashion entrepreneurs. According to prior research, fashion design entrepreneurs strive to sustain their enterprises due to a lack of information, networking and business-creation skills, as well as fundamental management, marketing, and branding abilities (Aakko & Niinimäki, 2018; Fernandes, 2019). Fashion design entrepreneurs are more likely to be driven by their artistic ambitions and the freedom to express their creativity than by business thinking, which might limit business development plans and commercial goals (Aakko & Niinimäki, 2018). As a result, this study will analyse the issues and difficulties within the landscape of the Malaysian fashion business. According to previous research, the term "fashion design entrepreneur" (FDE) was coined by fashion designers who, after gaining additional experience, went on to establish themselves as fashion entrepreneurs. These individuals have the potential to positively impact the nation's economy by generating new job opportunities. Google Scholar and Scopus were used to find indexed and non-indexed journals on fashion design entrepreneurship, design management, and the Malaysian fashion industry. Table 1 shows the research studies this study used after screening based on keywords. FDE's capacity to create original product designs is unique. However, these FDEs have management issues. To balance their business journey, they must address business stability (Fernandes et al., 2020).

Table 1. Literature review based on the selected keyword

Fashion design entrepreneurship	Design management and Fashion design management	Managerial skills
Fernandes et al. (2019)	Wen Ying & Konstantinos (2019)	Kozłowski et al. (2018)
R. Chepchumba et al. (2014)	Williams (2018)	Libânio & Amaral (2017)
Falay et al. (2007)	Tutia et al. (2017)	Zahro et al. (2017)
de Wet & Tselepis (2020)	Abrahamson (1996)	DiVito & Bohnsack (2017)
R. Chepchumba et al. (2014)	Baskerville & Myers (2009)	Overdiek (2016)
R. M. Chepchumba & Monica (2018)	Zeng & Xu (2010)	Marcella & Rowley (2015)
S. L. K. Benson (2017)	Libânio & Amaral (2017)	Kang et al. (2015)
Harvey (2013)	Pikas et al. (2018)	Moloi & Nkhahle-Rapita (2014)
Millsbaugh & Kent (2016)	Norman & Jerrard (2015)	Radaelli et al. (2014)
Aakko & Niinimäki (2018)	Kramoliš et al. (2020)	Tremblay & Yagoubi (2014)
Torres & Lee (2016)	Wolff & Amaral (2016)	
Fernandes et al. (2020)	Topaloğlu & Er (2017)	

LITERATURE REVIEW

Fashion design entrepreneur (FDE)

Entrepreneurship for designers usually starts with artistic expression and then shifts to fashion as a business (Aakko & Niinimäki, 2018). Sustainable fashion designers must be creative and business-minded. Strong fashion design entrepreneurs (FDE) must also focus on custom design. They must expand their vision to include an entrepreneurial business model (Fernandes & Pereira, 2019); Chepchumba & Monica, 2018). This is done to compete with fashion labels that are already available on the market, and a few elements need to be addressed. According to Aakko & Niinimäki (2018) suggested, FDE manages design, production, sales, networks, brand image, business strategy, and finances. Fashion design management also includes firm size and growth.

Malaysian fashion industry

According to Statista (2022), the Internet's contribution to the global GDP will have reached 23% by 2020. Despite this, the market will continue to expand over the next several years due to rising middle-class wages and greater online purchasing in East and Southeast Asian nations, particularly Malaysia. It is crucial to emphasise how the COVID-19 epidemic influences that nation's economic growth. FDEs, or fashion design entrepreneurs, are a relatively new concept in the Malaysian fashion business. However, there has been a discernible shift toward recognising the function of a fashion designer as an entrepreneur. In Malaysia, the epidemic has led to the cancellation or closure of several brand names (Mohd Zaimudin et al., 2021), including experienced brands. However, beginning in 2022, the Malaysian government will lift the Movement Control Order (MCO 3.0) for vaccinated people and declare COVID-19 an endemic disease (Majlis Keselamatan Negara, 2022). It relieved the people while slowly reviving the country's economy and reinvigorating all businesses. After two years of epidemic, e-commerce has become the norm. FDEs offer their products via their website, Zalora, and social media. Online shopping is prevalent (Rahimah et al., 2019). It is unclear how successful these platforms assist FDEs in achieving sales targets.

Fashion design management

Fashion design entrepreneurs (FDE) produce distinctive and original designs. In order to create sales, FDE needs to consider its customers' requirements and keep up with the trends, all without compromising its identity. Aside from that, (Abrahamson & Fairchild, 1999) FDEs should improve their skills and capabilities in order to advance in the company's management. The philosophy of design management serves as the foundation for fashion design management, which is illustrated in Figure 1.

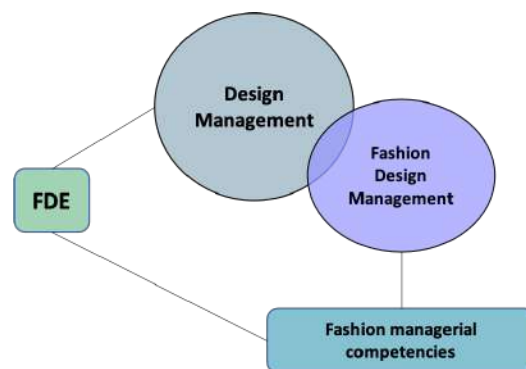


Figure 1. Theories in relation to the fashion design entrepreneur

According to Topaloğlu & Er (2017) design management, it affects strategic organisational structure during learning and competitiveness development to achieve sustainability. FDEs are also business owners, and they are responsible for ensuring they are proficient in all elements of company management, including marketing and sales. In addition, FDEs are responsible for managing the design as a component of the company's strategic purpose, including the precise insertion and integration of its competencies, processes, and strategies (Wolff & Amaral, 2016). The fundamental purpose of fashion design management is to produce a solution to comprehend the needs of the industry, as well as to determine the optimal time to market, construct a marketing strategy, and reduce design costs.

This is how the value of fashion design management is realised (Zeng & Xu, 2010). Tutia et al. (2017) suggest that when creating new products, all phases of the project and their environmental impacts must be considered. In the case of the FDEs, it is far simpler to develop new items that contribute to sustainability. On the contrary, managing the point of sale and promoting the products being sold is far more difficult. In other words, it is essential that each phase, including pre-production, production, distribution, usage, and disposal, be considered as having the objective of minimising the chance of any potential adverse results. In addition, Zeng & Xu (2010) recommend the establishment of a separate department that is only dedicated to the management of fashion design. This department will be in charge of conceptualising concepts for design management and considering how those ideas may be implemented into the organisation's larger strategy. Therefore, FDE requires an in-depth understanding of fashion design management and professional management skills to ensure the success of the business course.

RESEARCH METHODOLOGY

This study's data collection was conducted employing a qualitative methodology. The respondents are fashion design entrepreneurs (FDEs), or business owners in the Malaysian fashion design industry from Kuala Lumpur and Shah Alam. The selected respondents who agreed to engage in the focus group sessions provided data. The selection was made on the basis of predetermined study-related factors. Business owners who are also the most qualified individuals to provide invaluable research questions answers were selected as respondents. Three respondents were selected to engage in the online focus group discussion for the purposes of this study. Each respondent has more than five years of experience operating their own business and their annual income is less than RM300,000.00, classifying them as small to medium-sized enterprises.

The Zoom platform was employed for the study's virtual focus group discussion because it was more accessible to the respondents, who are accustomed to meeting online (Dos Santos Marques et al., 2020). One of the techniques used in qualitative research is called a focus group discussion, and its purpose is to investigate the participants' thoughts, experiences, and perspectives (Dos Santos Marques et al., 2020; Traynor, 2015). Focus group discussions utilised structured questionnaires throughout the data-collecting process. The moderator explained the data collection process to the participants during the focus group discussion, and the comments were videotaped throughout the process. Using NVivo 12, the acquired data were transcribed and analysed to illustrate the findings.

FINDINGS AND DISCUSSION

Findings

Group discussion research is fascinating. The responders addressed the discussion questions based on their personal experiences and business situations in the fashion industry. Respondents candidly

discussed their struggles to survive in the sector. This study may shed light on fashion design entrepreneurs' (FDEs) efforts to improve their talents and managerial abilities for the Malaysian fashion industry. This study could assist fashion designers in understanding management competency (Libânio & Amaral, 2017).

After transcribing the data, NVivo12 themes and coding were used to analyse the findings. Figure 2 shows the study's findings, showing respondents' challenges. The findings also reveal the support FDEs need to thrive in fashion. According to the focus group discussions, five study findings which contribute to FDE's lack of competence are: firstly, business management; secondly, financial management; thirdly, human resource management. Fourth is digital marketing; the fifth finding is additional influences that may impact FDEs as business owners. In order to be more robust in the Malaysian fashion sector, overcoming these flaws is of utmost importance.

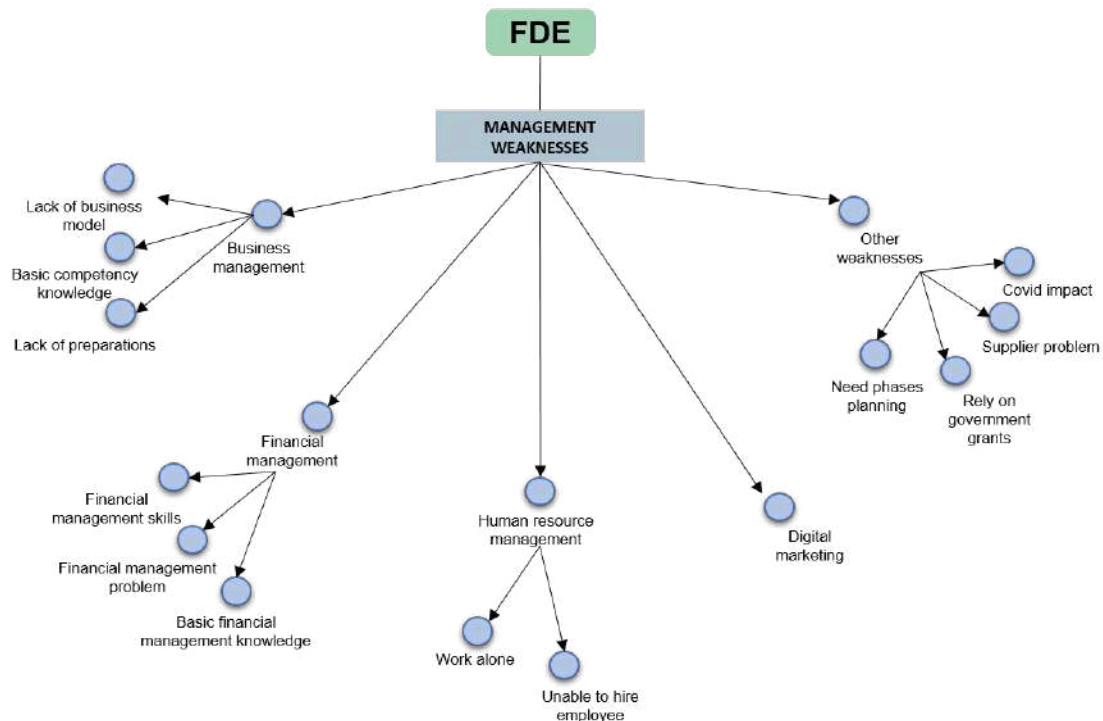


Figure 2. Fashion design entrepreneurs' findings using NVivo12

Business management

According to the report, business model use is low since survey respondents confront similar issues in business administration. A respondent states that she shifted from business-to-customer (B2C) to the business-to-business approach (B2B) to broaden the scope of her company's target demographic. Most responders have a fundamental understanding of management, resulting in limited comprehension of business knowledge. This is apparent in their lack of business plan preparation.

Financial management

Successful businesses demand good financial management. Effective financial management is a challenge for fashion entrepreneurs. The survey found that respondents lack financial management knowledge. In addition, they stated that their self-financing is their company's only source of startup capital, and that inadequate financial management limits have a detrimental impact on their business.

Human resource management

The vast majority of respondents to this poll indicated that they managed their business on their own with the assistance of part-time employees. Therefore, they have difficulty operating a fashion business that involves attention to more than just the creation of design products. It is difficult for them to be a steady business due to the absence of a team that can assist with financial management and marketing. As a result, they lack a grasp of human resource management, and the absence of a team of employees that assist in company management makes the situation much more challenging.

Digital marketing

Existing businesses are familiar with digital marketing as technology advances in Malaysia and around the world. The study found that respondents employ digital marketing methods, including developing a business website and using social media to promote and sell their fashion products. However, according to them, it receives less attention. Therefore, it is suggested that these individuals be provided adequate digital marketing opportunities to assist the business in reaching a wider audience. This is due to the fact that gaining access to customers via an internet business is both simpler and cheaper than gaining access to customers via a conventional, mainstream storefront.

Other deficiencies

Other deficiencies, as perceived by respondents and learned from the study's findings, require attention and rectification. Everyone agrees that the Covid-19 pandemic has negatively affected their business. Since incidences of this nature are inevitable, they must explore additional methods that can be adopted to ensure the continuous success of their organisation. The limitation that must be overcome is that the respondent must investigate supplier issues and effectively resolve them, as the supplier is crucial to ensuring that the business functions without interruptions. It is recommended that fashion design entrepreneurs should not only rely on government funding but also find other financial sources to resolve financial management issues. The results show that most management issues are in business management, human resources management, financial management, and digital marketing promotion. Thus, FDE must explore ways to improve its management. This enables the company to operate more efficiently and methodically in a fast-growing business world, especially the fashion industry. Preventing commercial rivalry requires precautionary actions.

Discussions

According to the study's findings, FDEs require specific skills and knowledge to improve their management capabilities in business management, finance, human resources, and digital marketing. Figure 3 depicts six proposals made by industry experts in the fashion business. These recommendations have the potential to be answers to the issues that FDEs are now facing. The implementation of these recommendations should be able to assist FDEs in their fashion businesses in a variety of ways, such as 1) obtaining financial support and grants, 2) expanding to international branding, 3) monitoring by industry experts, 4) training programmes for reskilling, 5) expanding the business digitally, and 6) collaborating with other businesses in the industry.

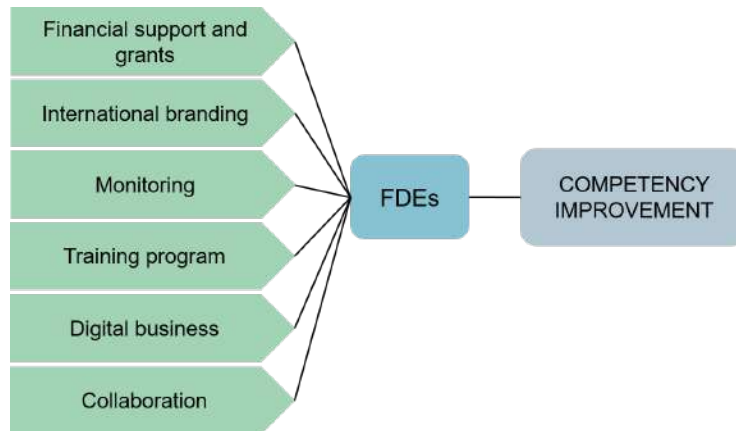


Figure 3. Recommendations made by industry experts to help fashion design entrepreneurs Obtaining financial support and grants

According to the findings of the study, the vast majority of respondents relied on their own means to finance their activities. Some individuals are aware of financial support available from local banks and government authorities. A few people have reported having knowledge of financial aid. They contend that preparing the necessary documentation is a challenging task that necessitates a large number of procedures. One of the respondents mentioned her participation in MARA in Fashion. Training and management classes are both offered by this government agency for FDEs. Another participant in the survey mentioned taking part in MARA in Fashion. She went on to say that participants who were eligible received financial grants in addition to financial loans.

From the findings, government entities recognise the importance of entrepreneurs to the nation's economy. Therefore, they provide assistance to those who wish to launch a business. Even though the bank imposes some requirements, the proposal can be evaluated. This is because to succeed in commerce, particularly in the fashion industry, one needs to make investments, either monetarily or in terms of producing new items. This is done to ensure that the company's growth will proceed smoothly.

Expanding to international branding

Malaysia's fashion industry is thriving and fiercely competitive. Participants in this study expressed a desire to expand their businesses internationally in the future. However, aggressive measures should be implemented to ensure that the goal of introducing local companies to the global stage is met. Bernard Chandran, for example, is Malaysia's King of Fashion, and his brand has been recognised in Paris and London. His designs have also been worn by Michelle Yeoh, Lady Gaga, Estelle, Tori Amos, and many others (Chandran, 2022). To expand their businesses internationally, FDEs must take advantage of any opportunity that can enable them to expand worldwide. They might, for instance, participate in fashion promotions organised by government entities like the Malaysia External Trade Development Corporation (Matrade). Matrade may assist fashion entrepreneurs with international brand promotion. Additionally, the government obtains a percentage of the revenues from the export of Malaysian fashion products, such as *batik* and *songket* textiles. The location is suitable for showcasing FDE Malaysia to worldwide fashion designers.

Monitoring by industry experts

According to the recommendations of fashion industry specialists, FDEs should seek monitoring from appropriate professionals in order to develop their management skills. Continuous monitoring may

give FDEs confidence in their ability to operate their enterprises successfully. Sessions devoted to the exchange of information with industry experts are another tremendous resource for anyone interested in enhancing their company management skills. This is owing to the fact that competencies and managerial abilities cannot be developed quickly. Rather, people who exert constant effort can enhance their understanding of company management.

Training programmes for reskilling

According to the findings, FDEs are expected to participate in continual training and upskilling in order to develop business management or product development skills. Consequently, various recommendations were obtained from the discussion, including enhancing one's digital marketing skills and enrolling in a social media content course to promote high-quality, community-relevant content. This is because the content shared on social media platforms may have an effect on the likelihood of prospective purchasers engaging with the brand.

Expanding the business digitally

It is suggested that in order to aid FDEs in enhancing their businesses, they should boost their digital business capabilities. Digital business is becoming an increasingly widespread trend in an increasingly competitive corporate world. FDEs are obligated to invest in the creation of websites that are both aesthetically pleasing and pertinent to the nature of their unique enterprises. Millennial generation members are continually linked to their electronic gadgets, such as their cellphones, computers, and tablets, and are always browsing the internet wherever they are. When looking for information about the newest products on the market, people require information that is easy to obtain. In addition, utilising the software supports the purchaser in getting a product that fulfils their requirements. Zalora Malaysia and Poplook, two examples of e-commerce platforms, are successful e-commerce platforms that have a big impact on the purchasing habits of the Malaysian populace. Therefore, FDEs should not reject this proposal because it has the ability to contribute to both brand promotion and an increase in product sales.

Collaborating with other businesses in the industry

Collaborations with the Malaysian Investment Development Authority (MIDA), Kuala Lumpur Fashion Week (KLFW), and AEON Retail Malaysia are a few examples of how FDEs can benefit in the extension of their company's performance. This is due to the fact that they are among the agencies that offer opportunities to promote domestic businesses on worldwide markets. FDEs are also capable of forming cross-industry collaborative partnerships inside the industry. Contemplate the collaboration between the local fashion designer Salikin Sidek and the local fashion company Kelambi. This method has been employed by international corporations in other nations, such as Virgil Abloh's Louis Vuitton x Nike Air Force 1s, Birkenstock x Manolo Blahnik, Jimmy Choo x Timberland and many more (Bein, 2022). Due to the fact that both businesses have followers and followers of the other, it has the potential to benefit both. If regarded in a positive manner, it may result in increased sales of their items.

As a driving force for the local fashion sector, FDEs should strive to increase their self-sufficiency and construct a more solid organisation. The emergence of fashion entrepreneurs without a background in fashion education has significantly impacted the local fashion industry climate. Nevertheless, FDEs should not be dominated by their existence. Rather, they should be allowed to engage in constructive competition and propose more inventive products in response to market demands.

CONCLUSION

Successful fashion designers often start their own businesses due to their product creation and management expertise. However, those hoping to find success in the fashion industry as entrepreneurs must have a firm grasp on the best practices for managing a business to maximise output and profit. Based on this research's results, a few key areas of business management could use some fine-tuning. Therefore, the rules might be used as a reference for aspiring fashion designers looking to start their own businesses and gain experience in key areas of business management.

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Product Service System in Circular Economy: A Bibliometric Analysis

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ABSTRACT

As global attention to sustainable development increases, more and more works of literature emphasise the application of a circular economy-oriented product service system (PSS). The Circular economy aims to achieve economic and environmental sustainability through efficiency of resources and minimisation of waste. Meanwhile, product service systems are an emerging business model with the potential to facilitate product life extension and recycling. However, despite the growth of this field of study, there are relatively few bibliometric analyses of its application in the circular economy. Therefore, this study aims to use the method of bibliometrics, and with the help of VOS viewer visualisation software, to analyse the relevant literature the application of product-service systems under the guidance of circular economy in Scopus database from 2014 to 2023, and to discuss the publication types and trends, source distribution of publications, the most highly cited articles, and research hotspot keywords analysis. This study found that keyword analysis identified four main topic clusters, in which significant hotspots focused on the Internet of Things, Industry 4.0, consumer behaviour, and reverse logistics. Therefore, this study may benefit researchers who wish to understand relevant academic results circular economy-oriented PSS applications.

Keywords: *Circular economy, Bibliometric analysis, Product service system, Sustainable development.*

INTRODUCTION

In today's context of global sustainable development, the circular economy (CE) has received extensive attention (Merli et al., 2018). According to data from the United Nations Environment Program (UNEP) (2022), global municipal solid waste generation is expected to increase from approximately 2.24 billion tons in 2020 to 3.88 billion tons in 2050, which means that the amount of waste is showing a continuous growth trend. The United Nations (2023) first held International Zero Waste Day on March 30, 2023, in response to this challenge. The goal is to promote a "green" shift to sustainable production and consumption patterns, support the social transition to a circular economy, and increase awareness and participation in zero-waste initiatives. Because the traditional linear economic model has been unable to meet the sustainable development needs of society, therefore, there is a need to transform the economic model, and circular economy, as a viable solution, aims to address the interlinkages between the environment and economic activities (Andersen, 2007; Merli et al., 2018), by establishing a closed-loop circulation system. Instead of the traditional open-loop setup, change the linear production and consumption pattern. In closed loop systems, the value of products, materials and services is kept in active use for as long as possible through the principles of recovery, reduction, and reuse (Merli et al., 2018). In short, the core concept of the circular economy is to combine economic development with resource utilisation and environmental protection and to maximise the value of products and services while reducing resource consumption and waste generation by establishing a closed-loop system.

Over time, it has become increasingly popular in various disciplines, such as environmental studies (Joensuu et al., 2020; Schwarz et al., 2021; Munaro et al., 2020), energy (Sharma et al., 2020), production and manufacturing (Bjørnseth et al., 2021; Ciliberto et al., 2021), education (Kirchherr & Piscicelli, 2019), healthcare (Boerdonk et al., 2021), etc., are widely disseminated. Supported by research and scientific reports, the CE is flourishing (Pamucar et al., 2023), stimulating people's attention and action on sustainable development. This trend helps to use resources more efficiently, reduce environmental pollution, promote economic prosperity and social progress, and lay a solid foundation for future sustainable development.

In the circular economy concept, authors such as Stahel (1982) and Schmidt-Bleek (2013) found these benefits of the product service system (PSS) concept. In addition, combined with the current renewed interest in sustainability and resource efficiency has driven the focus on PSS (Tukker, 2015). PSS is recognised as one of the powerful tools to promote a resource-efficient circular economy and achieve a much-needed "resource revolution" (Tukker, 2015), it can enable economic growth while reducing resource consumption and environmental impact (Huetao, 2012), significantly transforming products into services, changed the traditional "ownership" model, Mont (2002) put forward related solutions, such as providing product use rights, leasing products, repairing and other services, allowing users to pay more attention to the use value of products rather than ownership, minimising the impact on the environment (Coelho et al., 2020; Matschewsky, 2019). Therefore, from product design and production to consumption and waste management, through applying PSS under the guidance of circular economy, the effective use of resources and the minimisation of waste can be realised to the greatest extent.

Although PSS has been extensively explored in theory and practice, there has been relatively little bibliometric analysis of its application in the circular economy. Currently, most studies focus on the concept, design principles and implementation methods of PSS, and there is a lack of comprehensive research and evaluation on the application of PSS in the actual circular economy.

Therefore, it is necessary to conduct a bibliometric analysis to systematically review and analyse the research on applying PSS under the guidance of the CE. We will reveal the research hotspots and

central themes of PSS application, which will help in-depth understanding of the current situation of PSS application under the guidance of CE, providing theoretical and practical guidance for related research.

MATERIALS AND METHOD

Literature resources

The primary source of literature is taken from Scopus. The database provides consistent and unified citation analysis records and resources with access to complete citation records and multiple sub-databases of scientific literature data, such as Conference Proceedings CitationIndex-Science (CPCI-S), Scopus Science Citation Index Expanded (SCI-E), and Social Sciences Citation Index (SSCI) (Singh et al., 2021). As a widely used peer-reviewed literature repository covering high-quality journals in multiple fields. Therefore, researchers can rely on the Scopus database to obtain literature information in related fields, understand the latest developments in the research field, main authors, citation trends, etc. This comprehensive coverage and reliability make Scopus one of the essential sources for researchers to conduct bibliometric analysis (Lam & Habil, 2021).

Collection strategies

The search was done for this work on May 25, 2023 (Malaysian Time, 6:30 pm) to avoid changes due to the number of publications and citations. The search rule is Title-Abstract-Keywords = (circular economy OR recycling economy OR cyclic economy OR CE) AND (Product Service system OR PSS), which means circular economy and product service system included in abstract, title and keywords. Publication records for terms, with a period set from 2014 to 2023. We excluded some literature types like Note, Erratum, and Data paper. A total of 763 documents were acquired and exported as "CSV Excel" for further bibliometric analysis and visualisation.

Statistical analysis

As a research method, bibliometrics analysis uses mathematics and statistics to conduct quantitative analysis of scientific research documents such as documents, papers, and journal articles. The VOS viewer bibliometric analysis software imports sample bibliographic data and draws network maps (Huang et al., 2022). Analysing relationships among publications, citations, co-citations, and keywords through powerful network visualisation, VOS viewer can map and display networks, revealing the structure of research fields (Van Eck & Waltman, 2017). It allows the researcher to explore the visualisation results independently and interactively, providing deeper insights (Puspitarini, 2023), enabling a better understanding of related fields' development trends and research direction.

RESULTS & DISCUSSIONS

Publication types and trends

The database analysis shows that, as shown in Table 1, there are eight main types of documents, among which the largest category is articles, accounting for 61.3% of the contribution, followed by conference papers, accounting for 17.6%, and the least is editorials, accounting for 0.3%. These data

reflect the distribution of different types of documents in the database, and articles and conference papers occupy a dominant position in the contribution rate, accounting for most of the proportion.

Table 1: General information on publications (2014-2023)

Rank	Type of Document	No.	Percentage
1	Article	468	61.3%
2	Conference Paper	134	17.6%
3	Review	70	9.2%
4	Book Chapter	58	7.6%
5	Conference Review	19	2.9%
6	Book	6	0.8%
7	Short Survey	3	0.4%
8	Editorial	2	0.3%
	Total	763	100%

Figure 1 shows that the last 10 years of research on PSS from a circular economy perspective has shown a growth trend, which, despite several ups and downs, still indicates a growing interest in the topic. There is an overall upward trend with respect to the number of citations, with the total number of citations peaks at 2953 in 2018 and then gradually declines. Due to the initial stage, the number of publications may be relatively small, which may take time to gain influence from accumulating new publications. Over time, as more research is conducted and published, the number of publications on the subject will likely increase rapidly, along with a gradual increase in citations. The circumstance also means that the topic has not yet reached its maturity stage and will still attract more research. It is worth noting that the number of publications and citations are only part of the measure of scientific productivity and influence, and the comprehensive consideration of other indicators and factors can more comprehensively assess the development and impact of a topic (Norouzi et al., 2021). In general, the research on product service systems from the perspective of the circular economy is booming, attracting more and more scholars' attention. Although some achievements have been made, further exploration and research still needed to promote widespread application of the concept of circular economy in practice.

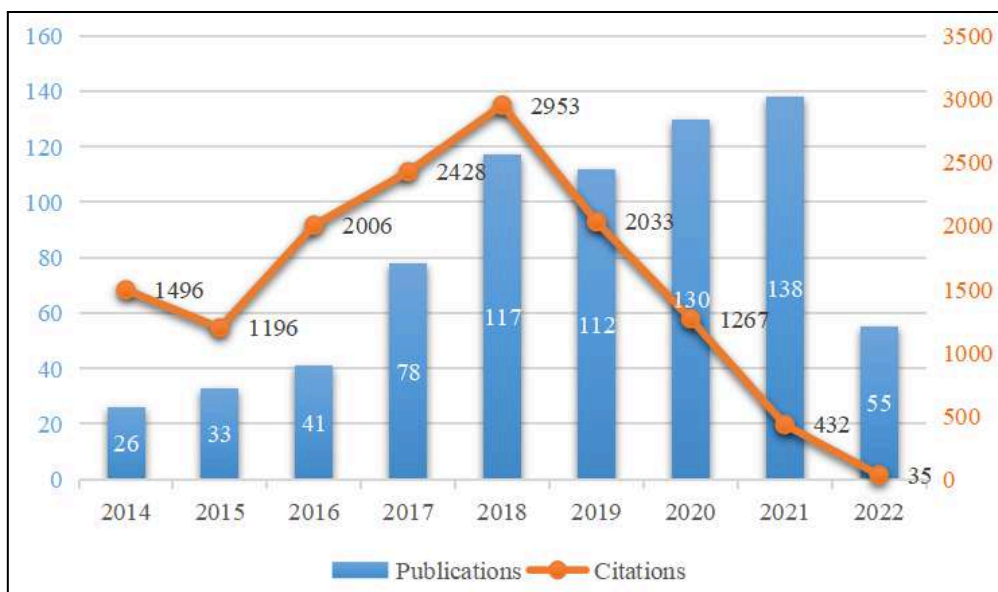


Figure 1. Changes in the number of publications and total citations (2014-2023)

Publication source distribution 763 articles published in various 159 journals. These journals are distributed in different fields of knowledge, such as Engineering, Environmental Science, Energy, Business, Management And Accounting, Social Sciences, Computer Science, etc. This shows that this topic has attracted the attention of a wide range of researchers as relevant research to promote environmental and economic development in other fields, involving multiple fields of knowledge. This shows that the product service system from the perspective of circular economy as a relevant research to promote environmental and economic development in other fields has become a research topic of interdisciplinary cooperation, and various fields have shown interest in this topic. This Study Summarises the 10 journals with the most publications on relevant topics, as shown in Table 2. Among them, "Sustainability" published the most 74 articles, this might be because the journal focuses on research in the fields of sustainable development and environmental protection, and the product service system oriented by circular economy has received extensive attention on important topics in this field. Followed by "Journal of Cleaner Production" (65), "Procedia CIRP" (43), "Resources Conservation and Recycling" (20), and "Sustainable Production and Consumption"(15 articles).

Table 2. Top 10 journals of publications (2014-2023)

Source Publication	No. of Publications
Sustainability	74
Journal of Cleaner Production	65
Procedia CIRP	43
Resources Conservation and Recycling	20
Sustainable Production and Consumption	15
Journal of Industrial Ecology	12
Journal Of Materials Chemistry C	9
Applied Sciences Switzerland	8
Business Strategy and The Environment	8
IFIP Advances in Information and Communication Technology	7

The Most Highly Cited Articles

Highly cited literature often represents classic or influential research in this field, and its analysis can help researchers gain an in-depth understanding of the significant research results, the knowledge base and the development of this field. Co-citation analysis was performed on the collected documents, and the minimum citation frequency was set to 100. A Total of 35 papers meeting the set requirements were screened out, and the top 10 highly cited papers on circular economy and product service systems from 2014 to 2023 were sorted out, as shown in Table 3. The most cited article is "Product Services for a resource-efficient and circular economy—a review" (Tukker, 2015), published in the Journal of Cleaner Production in 2015 with 1073 citations. This review article concludes by analysing the research literature in the field of PSS, summarising the development trends and critical issues of the past decade; this shows that this review article has extensive academic influence and citation value in this field. The second article, "Current options for the valorisation of food manufacturing waste: a review" (Mirabella et al., 2014), was published in the Journal of Cleaner Production in 2014 and received 694 citations. This article discusses good manufacturing waste and current options for value-based processing, highlighting the application of industrial symbiosis in recycling food processing waste and presenting the main uses and application areas of waste conversion into valuable components. The third article, entitled "Circular business model innovation: inherent uncertainties" (Linder & Williamer, 2017), was published in Business strategy and the environment in 2017 and was cited 442 times. This article highlighted the uncertainties and challenges faced by circular economy business model innovation, and provided important theoretical and practical guidance for enterprises in the process of circular economy transformation. It is worth noting that among the ten highly cited papers, there are five review articles, which reflect that the comprehensive review and collation of this field has begun to be valued and provides a basis for further research.

Table 3. Top 10 highly cited papers (2014-2023)

No.	Author	Title	Journal	Year	Citation
1	Tukker, A.	Resource-efficient and circular economy—a review	Journal of Cleaner Production	2015	1073
2	Mirabella, N., Castellani, V., & Sala, S.	Current options for the valorisation of food manufacturing waste: a review.	Journal of Cleaner Production	2014	694
3	Linder, M., & Williander, M.	Circular business model innovation: inherent uncertainties.	Business Strategy and the Environment	2017	442
4	Witjes, S., & Lozano, R.	Towards a more Circular Economy: Proposing a framework linking sustainable public procurement and sustainable business models	Resources, Conservation and Recycling	2016	371
5	Corona, B., Shen, L., Reike, D., Carreón, J. R., & Worrell, E.	Towards sustainable development through the circular economy—A review and critical assessment on current circularity metrics.	Resources, Conservation and Recycling	2017	285
6	Bressanelli, G., Adrodegari, F., Perona, M., & Saccani, N.	Exploring how usage-focused business models enable circular economy through digital technologies.	Sustainability	2018	277
7	Kristensen, H. S., & Mosgaard, M. A.	Reviewing literature on digitalisation, business model innovation, and sustainable industry: Past achievements and future promises	Journal of Cleaner Production	2020	273
7	Parida, V., Sjödin, D., & Reim, W.	Two life cycle assessment (LCA) based methods to analyse and design complex (regional) circular economy systems. Case: Making water tourism more sustainable.	Journal of Cleaner Production	2016	227
8	Pagoropoulos, A., Pigosso, D. C., & McAloone, T. C.	The emergent role of digital technologies in the Circular Economy: A review.	Procedia CIRP	2017	226

Keywords analysis

Keywords represent the author's high-level summary of the research paper and are a concise way of expression. By analysing and organising key words in the literature, it can help researchers systematically understand the research trends in a specific field (Huang et al., 2022), help researchers grasp the current research hotspots in the area, and provide further insights into in this study, the author's keyword network diagram generated by VOS viewer software is used to analyse, in which each node represents a keyword. The lines between nodes represent the co-occurrence relationship between keywords resulting in frequently co-occurring keywords forming clusters, as shown in Figure 2. The keywords are divided into four clusters, respectively in the red, green, blue, and yellow clusters. In addition, the network graph also includes information about keyword frequency, which is very helpful for evaluating the importance and popularity of keywords in research. Keywords with higher frequency may be the core vocabulary of the

investigation, reflecting the importance of the topic in the literature and the degree of research attention, as shown in Table 4.

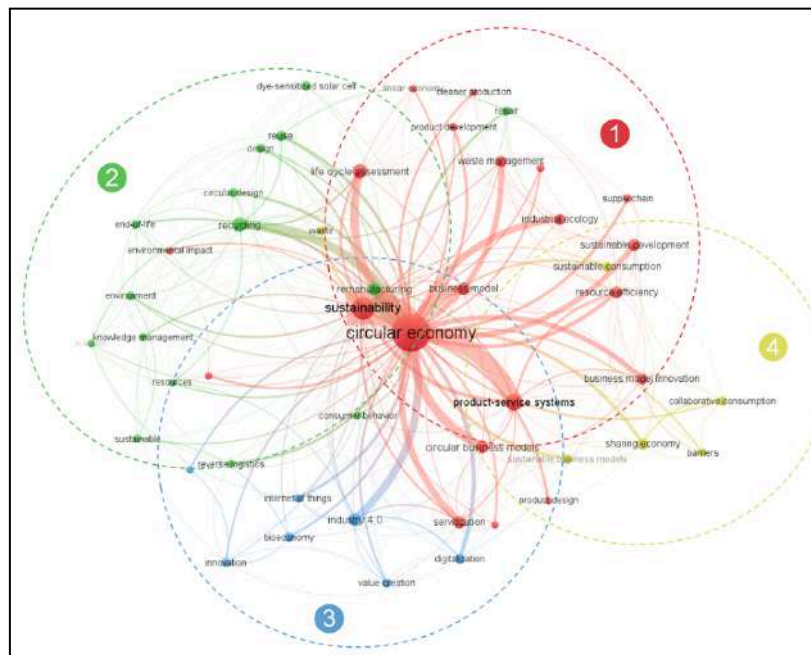


Figure 2. Keywords co-occurrence network (2014-2023)

Table 4. Keywords within the clusters

Cluster	Keywords
Business Mode	Business model (19), Business model innovation (14), Circular business models (21)
Red Cluster	Circular economy (356), Cleaner production (5), Environmental impact (5), Industrial ecology (14), Industrial symbiosis (6), Life cycle assessment (27), Linear economy (5), Product design (5), Product development (6), Product-service systems (42), Resource efficiency (15), System dynamics (5), Servitization (18), Supply chain (6), Supply chain management (5), Sustainability (90), Sustainable development (15), Waste management (14), Circular design (8), Consumer behaviour (6), Design (8), Dye-sensitized solar cell (8), E-waste (5), End-of-life (7), Environment (7), Knowledge management (6), Recycling (28), Remanufacturing (22), Repair (7), Resources (5), Reuse (11), Reverse logistics (6), Sustainable (6)
Green Cluster	Sustainability, Design & Waste Management: Bioeconomy (9), Digitalization (10), Industry 4.0 (22), Innovation (7), Internet of things (7), Renewable energy (5), Value creation (7)
Yellow Cluster	Sustainable Consumption & Collaborative Business Models: Barriers (6), Collaborative consumption (8), Sharing economy (13), Sustainable consumption (11), Sustainable Business Models (8), Waste (6)

Red cluster (cluster 1), these keywords reflect the core concepts, methods and concerns of the field of product-service systems and circular economy, covering business model innovation, resource efficiency, circular design, environmental impact, supply chain management, waste management etc. They play an important role in achieving sustainable development and solving environmental problems. When designing services, advocating circular economy principles is a key strategy that extends the life cycle of

products and services in the design domain. Through the practice of circular economy, resource consumption and waste generation can be reduced (Preist et al., 2016; Kjær et al., 2018), and waste can be transformed into valuable resources (Maiurova et al., 2022) to improve resource utilisation efficiency, thereby improving environmental conditions.

Green cluster (cluster 2), which reflects important issues and practices in product service systems and circular economy, can be derived from "design", "consumption behaviour", "recycling", "remanufacturing", "reuse", "remediation", and other keywords to conclude. In the current context of strengthening environmental regulations and increasing economic viability, there is an increasing interest in product recovery and utilisation in the industrial sector (Fegade et al., 2015). Especially in the current economic environment, the dilemma many businesses face is not only on how to minimise and dispose of waste properly and convert waste into revenue-generating resources (Hatcher et al., 2013). The key to this transformation lies in the realisation of the concept of circular economy through the recycling and utilisation of waste, turning it into valuable resources, to realise the recycling of resources and the improvement of economic benefits (Ghisellini et al., 2016; Maiurova et al., 2022). Therefore, the industrial field is increasingly aware of the importance of recycling and utilisation and is actively seeking innovative solutions to promote sustainable development and environmental protection.

Blue cluster (cluster 3), these keywords relate to bio-economy, digital technology, industry 4.0, innovation, Internet of Things, renewable energy and value creation, etc., which are essential to developing product service systems and realising the sustainable economy's significance. Integrating these keywords into the design, production and delivery of products and services can promote economic transformation and innovation and achieve the goals of efficient use of resources and sustainable development.

The establishment of a product service system under the circular economy, combined with the application of new technologies, can promote innovation and value creation, such a digital technology and the support of the Internet of Things; enterprises can provide personalised products and services, and create new business models and value chains (He et al., 2020; Kamble et al., 2019), to help companies better understand consumer needs, adjust products and services in real-time, provide customised solutions, increase customer satisfaction and market competitive advantage. At the same time, adopting renewable energy can reduce dependence on traditional energy sources and reduce environmental impact (Hossein Motlagh et al., 2020; Nizetić et al., 2020). Using new technologies, companies can turn sustainability challenges into competitive advantages (Villiers et al., 2020), promoting corporate sustainability and commercial success.

Yellow cluster (cluster 4), these keywords relate to some critical issues and challenges developing product-service systems, including transforming consumption patterns, resource sharing and recycling, realising sustainable business model development goals, etc. In The Circular Economy context, these issues become more urgent and vital. As an emerging business model, PSS has the potential to promote product life extension and recycling (Pieroni et al., 2019) and plays an important role in promoting the development of a circular economy, realising the effective use of resources and reducing environmental impact. However, implementing PSS also faces some challenges, which need to overcome barriers, collaborative consumption (Retamal, 2019) and sharing economy (Plewnia & Guenther, 2018), promote sustainable consumption and business models, and reduce waste generation, promote product services the system move s in a more sustainable direction.

While 49 keywords appeared most frequently (more than five occurrences) in this study, the circular keyword economy appeared 356 times in publications, followed by sustainability (90) and product service systems (42). The overlay visualisation of the keyword co-occurrence network shown in Figure 3. It recently appeared in the research of product-service systems under the guidance of the circular

economy. It is an emerging research direction and has become a significant topic in the contemporary economic and social fields. The research areas are detailed below as potential research hotspots.

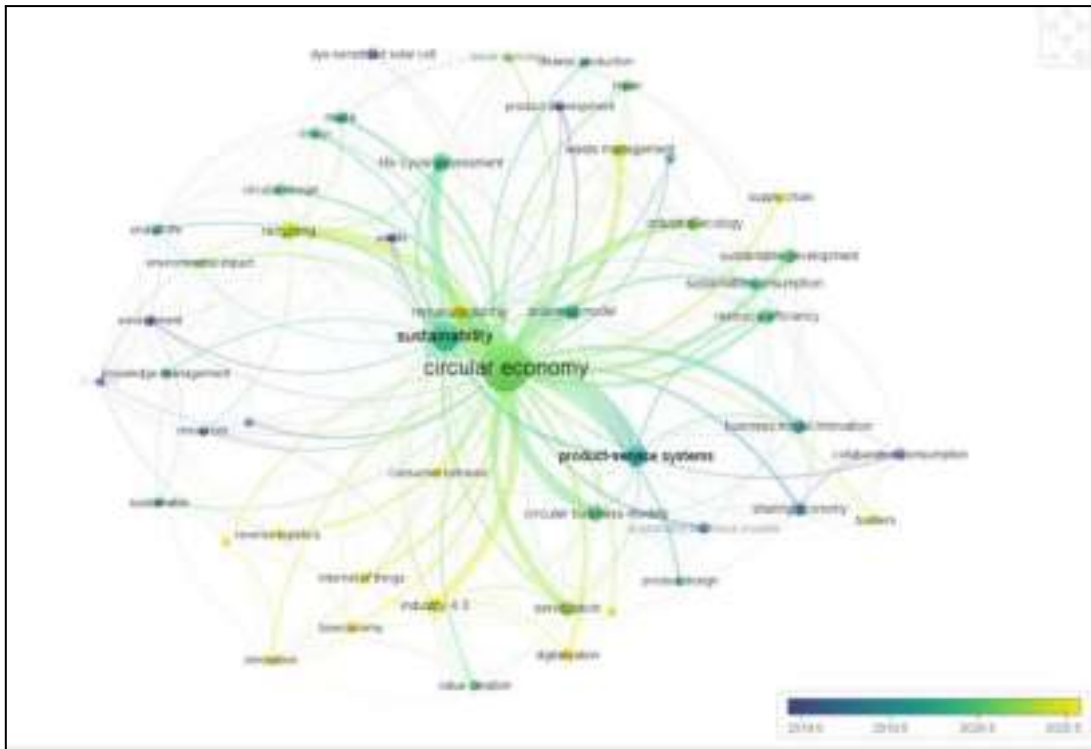


Figure 3. Research hotspots co-occurrence map density (2014-2023)

The application of product-service systems on the Internet of Things research under the guidance of circular economy is one of the frontiers of current literature research. With the rise of the concept of circular economy and the importance of sustainable development, combining the principles of circular economy with Internet of Things technology to provide more sustainable solutions through the integration of products and services has become a research hotspot (Voulgaridis et al., 2022). The circular economy-oriented product-service system aims to maximise the use of resources and reduce waste generation by transforming product provisioning service-centric models (Heyes et al., 2018; Witjes & Lozano, 2016). The Internet of Things technology plays a key role in it. Through the connection of physical devices and sensors, remote monitoring, data collection, and analysis of products can be realised (Tao & Qi, 2017). In this way, product usage efficiency can be optimised, and product life can be extended. life cycle (Herterich et al., 2015).

Another hot topic is research in Industry 4.0. Industry 4.0 focuses on digitisation, automation, and intelligence, integrates physical and digital systems (Zhou et al., 2015), and realises the optimisation and intelligence of the production process through technologies such as the Internet of Things, big data analysis, and artificial intelligence. The product service system under the guidance of the circular economy is in line with the concept of Industry 4.0. By Integrating the principles of circular economy and Industry 4.0 technology, the efficient use of resources, the reduction of waste and the management of the product life cycle can be realised (Nascimento et al., 2019). This is not only in line with the concept of sustainable development, but also helps to improve the production efficiency and competitiveness of enterprises. In the future, the combination of a circular economy and Industry 4.0 will become an important means to promote industrial development and environmental protection (Nascimento et al., 2018); (Bai et al., 2022).

Another research focus is the study of consumer behaviour, which explores consumer acceptance, attitudes and behaviours towards sustainable products and services. With changes in social and economic environments, consumer behaviours are also evolving (LAL, 2012), such as the rise of sustainable development and circular economy, which raise new issues and challenges for consumer behaviour research. The traditional linear economic model emphasises one-time consumption and waste of products, while the product service system guided by circular economy emphasises the continuous use and recycling of products. By providing a product-oriented, usage-oriented and result-oriented service model (Tukker, 2004), consumers can enjoy the product's functions and services without owning the product's ownership (Beuren et al., 2013). This transformation can meet consumers' needs for functions and experiences and align with their sustainable development and environmental protection values.

The last featured topic has important applications in reverse logistics research. It involves product recycling, remanufacturing, reverse supply chain management, etc. (Julianelli et al., 2020). Although reverse logistics burdens the company, it can contribute to its finances (Larsen et al., 2018). At the same time, it can establish a long-term cooperative relationship between customers and the company (Jayaraman & Luo, 2007), and the company can recycle used products and remanufacture, prolonging product life, reducing resource consumption and waste generation (Khor et al., 2016).

CONCLUSION

In this study, the bibliometric approach was adopted to analyse 763 publications the application of product-service systems under circular economy orientation from 2014 to 2023. There records extracted from Scopus were integrated and conducted as an in-depth analysis with VOS viewer. A comprehensive understanding was gained of the research status and development trends on product-service systems within the field of the circular economy.

According to the analysis findings, there is an ongoing upward trajectory in the number of publications, indicating a sustained growth pattern. This rapid acceleration demonstrates the increasing prominence of product-service systems implemented within the circular economy framework. This area of focus is gaining significant attention. The primary scholarly sources that prominently contribute to this field include "Sustainability", "Journal of Cleaner Production", and "Procedia CIRP", which rank among the top three publications. The articles with the highest number of citations are "Product Services for a Resource-efficient and circular economy—a review," "Current Options for the Valorisation of food manufacturing waste: a review," and "Circular Business model innovation: inherent uncertainties." These publications have received significant attention and recognition in terms of citation count. In terms of keyword analysis, the primary research topics predominantly revolve around circular economy, sustainability, and product service systems. Notably, the research hotspots include the Internet of Things, Industry 4.0, consumer behaviour, and reverse logistics. These areas have garnered substantial interest and attention among researchers. Through this study, we hope to provide researchers and policymakers in the field of circular economy with a comprehensive understanding of the application of PSS in the circular economy. At the same time, we can also discover research hotspots and potential development directions in this field, providing reference and guidance for future research.

Finally, it is acknowledged that this study has certain limitations. Firstly, the study only used one database to retrieve information and did not include publications outside the Scopus Database, possibly excluding some influential articles. Furthermore, a subset of the retrieved documents exhibits a relatively tenuous connection to the field of product service system application within the circular economy framework. In addition, the manual screening process has a certain degree of subjectivity. Therefore, future research should utilise multiple databases to search publications and apply text data mining tools to

filter the results to improve the accuracy of the analysis. Overall, despite the limitations, the bibliometric analysis can still provide compelling evidence of discernible and promising research trends in the field of product service system application within the circular economy framework.

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An Investigation Into The Reading Direction Preferences Of Generation Z: A Study On The Design Of Asian Winter Olympics Posters

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ABSTRACT

Visual design is a crucial tool for communicating ideas through images rather than words or printed text. It enables readers to visually interpret and understand information, potentially solving problems across various life aspects. Traditional reading patterns usually flow from left to right and from top to bottom, while some Asian scripts are written in horizontal rows from left to right or in vertical columns from top to bottom. Lines guide the eye between sections and visual elements, while white space allows the eye to rest and focus on targeted areas. The purpose of arranging the five elements of layout design—text, images, lines, shapes, and white space—is to capture the reader's attention and effectively convey information. In this study, researchers conducted a visual content analysis of a poster with 40 Generation Z respondents to investigate their reading direction. This generation is known for its frequent use of various gadgets and preference for short, simple text to comprehend content. The researchers intentionally designed a vertical banner-sized poster representing the Asian Winter Olympics as a sample. The events included Sapporo 1972 and Nagano 1998 in Japan, PyeongChang 2018 in South Korea, and Beijing 2022 in China. The poster is segmented into four sections from top to bottom, each depicting one of the Winter Olympics events from 1972 to 2022. Coding categories were developed to analyse text layout, lines, and white space. However, the colours and images of these emblems and symbols of the Winter Olympic Games were predetermined, so colours and images were not examined in this study. This exploratory study of Generation Z offers an analytical approach to understanding the reading orientation of Generation Z and serves as a basis for future research. Additionally, several informants tended to scan the poster for information, even though it was not indicated that the poster could be interacted with via an app on their mobile phones.

Keywords: *Winter Olympics, Generation Z, Layout Design, content analysis*

INTRODUCTION

Visual design is a vital communication tool that conveys ideas via images rather than words or printed text. Design aids in helping readers visually interpret and understand information, addressing challenges in various facets of life. Traditionally, readers move from left to right and from top to bottom, while some Asian characters are written either left to right in horizontal rows or top to bottom in vertical columns (Siek et al., 2023). Lines direct the eye between sections and elements, and white space provides a resting area to focus on particular sections. The arrangement of the five layout design elements—text, images, lines, shapes, and white space—aims to draw the reader's attention and relay information (Siek & Lee, 2021). In the age of integrated media, the evolution of poster design offers increased creative opportunities. The advancement of new media has introduced fresh perspectives on communication concepts and forms. Posters can be employed across various design fields in both two- and three-dimensional forms. Combining graphics with text gives a significant edge in information delivery, creating visually compelling and comprehensible presentations that cater to the quick absorption of information required by modern audiences. The growing necessity for rapid information comprehension calls for distinctive visual experiences. Olympic poster design is a form of visual communication that goes beyond the constraints of language, ethnicity, and national boundaries (Ceken & Aybay, 2021). It not only captures moments of excitement but also provides an alternative to the tedium of extensive text reports.

As a visual medium, posters incorporate aspects of Olympic advertising that reflect the era and the cultural characteristics of the host country (Lilea, 2023). They also capture the artistic, political, and social contexts of their time (Shapiro, 2009). The first modern Olympic Games were held in Athens in 1896. At that time, there was no significant poster design; only the cover of the report to the International Olympic Organizing Committee was used, which later became the emblem for subsequent games. During the second Olympic Games in France, a memorable poster depicted a woman dressed in authentic French chivalric attire, holding the three traditional French weapons—the foil, the sabre, and the heavy sword—in her right hand. Since the 20th century, posters have been instrumental in announcing the Olympic Games. Their broad appeal and ability to display eye-catching and memorable images make them an excellent medium for disseminating information about the Games. Similar to any influential promotional material for an educational exhibition, a concise description generates several questions, and the main function of a poster is to promote the upcoming Olympic Games. However, the mention of "striking and memorable images" suggests an appeal to visual elements and their aesthetic attraction (Hughson, 2010). The new generation of posters emphasises narrative representation to convey meaning, uses direct eye contact to enhance interactive meaning, and customises information value, salience, and framing to establish constitutive meaning (Zhang, 2023). The primary purpose of visual design is not just to create an appealing look but also to evoke emotions that enhance the overall experience (Shiau Gee et al., 2019). Visual design is a multidimensional and practical form of fine art applicable in various domains (Liu & Ji, 2023; Wang, 2023).

Nevertheless, Generation Z, known for its frequent use of various gadgets (Ling, 2020), prefers short and simple texts for content comprehension. This study aims to analyse the reading direction of Generation Z. The researchers opted to create a vertical banner-sized poster of the Asian Winter Olympics as a sample, featuring Sapporo 1972 and Nagano 1998 in Japan, PyeongChang 2018 in South Korea, and Beijing 2022 in China. The poster is divided into four sections, each representing one of the Winter Olympics events from 1972 to 2022. Coding categories were developed to analyse text layout, lines, and white space, but as the colours and images of the emblems and symbols were predetermined, they were not the focus of this study. In this study, a content analysis was conducted with 40 Generation Z respondents to provide a comprehensive examination of Generation Z's reading direction and to reflect on how aesthetic preferences in reading directions have evolved in response to societal changes.

The theoretical framework for this analysis follows Feldman's four-step structure of criticism, which includes description, analysis, interpretation, and judgement (Feldman, 1993, p.100). This study aims to engage the public and serve as a conduit for enhancing understanding of visual arts, shedding light on Malay symbolism, and fostering greater appreciation for the meanings behind an artist's work. It also seeks to encourage public appreciation and understanding of the concept of beauty within the context of Malay cultural traditions in visual arts.

LITERATURE REVIEW

Ancient civilizations recorded their experiences through cave paintings, but the advent of writing enabled the storage of records in textual form. Eventually, advancements in printing technology during the late thirteenth century revolutionised the dissemination of information on a larger scale. The use of imaging technology has significantly contributed to the education and culture of various socio-economic groups. Furthermore, it has made advice more widely available in diverse forms, increasing its effectiveness and reach. The Spanish historical missionary González de Mendoza suggested in his 1585 book "History of the Great and Mighty Kingdom of China" that Gutenberg might have been influenced by Chinese printing technology (Shen, 2023).

Chinese printed materials were introduced into Germany via two routes: one through Russia and the other through Arab traders who transported books. Gutenberg is believed to have used these books as templates for his printing innovations. The advent of printing addressed the issue of error-prone and time-consuming manual transcription, thereby accelerating the pace of cultural dissemination and development (Zhou, 2022). The necessity to support the printing process led to the development of Gutenberg's graphic design work. Initially, woodblock prints were utilised only by a select few—kings and monks in Europe—to create posters, which limited their popularity. Posters did not begin to be used on a large scale until the 17th century when the East India Company started printing advertising posters. The popularity of commercial posters increased further during the 18th century. The origins of posters can be traced back to the widespread use of paper-based mass reproduction techniques (Hu, 1996). Cultural posters typically include advertising for social, leisure events, and exhibitions (Sun & He, 2016). The layout of these posters is crucial because the aesthetic appeal and persuasiveness of the design influence daily life and contribute to the development of modern cultural posters (Zhao, 2019).

Visual Communication Design

Visual communication design is an expressive form that employs visual elements to convey information to an audience. It is the aspect of visual design that focuses on establishing a harmonious relationship between form and content. Visual design is a practical art applicable to many facets of communication. It involves a range of modelling techniques, including two-dimensional and three-dimensional shapes, as well as dynamic and static art forms. In their book "Reading Images: The Grammar of Visual Design," Kress and Van Leeuwen discuss the existence of diverse discourses in human communication. They posit that images function as social symbols that convey narratives and concepts (Kress & Van Leeuwen, 2020).

Visual Design Features

Visual semiotics defines interpersonal meaning as the interactional significance of images. This encompasses the relationship between the image creator, the person or object depicted in the image, and

the viewer (Yu, 2019). The "Winter Olympics" poster is designed to promote the Winter Olympics in Asia. Its focus is on analysing the logos of the last four Winter Olympic Games held in Asia and highlighting the connection between the Winter Olympics mascots and the backgrounds of the posters.

Significance of Visual Design

In cross-cultural engagement and cultural integration, posters are recognized as design artefacts and fundamental advertising tools, with colour regarded as the most significant and captivating element of the composition (Pryshchenko, 2021). Graphic design serves as a potent means of visual communication, grounded in design and aesthetic principles, and employs components such as shapes, colours, and fonts to create visually engaging materials. New technological advances necessitate the use of highly visual information, which demands expertise in visual design skills (Kuba & Jeong, 2022). A well-designed layout underscores the importance of layout design by eliminating the necessity for viewers to read every word meticulously to comprehend the entire content on the screen. Modality is crucial for determining interactive meaning, encompassing high, medium, and low modalities. This includes factors like colour saturation, readability, brightness, and image adjustments (Yu, 2019).

Sequence of Reading

Mastering visual design in poster creation involves understanding and applying the principles and rules of visual perception. The behaviour of visual enhancement in masterful visual design stems from and evolves with nature; it is the deliberate application of these principles to craft images that effectively transmit a specific message within a given visual context (Lin, 2019).

Principles of Visual Design

The initial step in generating a poster layout using visual design principles is to ascertain the placement of visual elements to establish a clear flow. This primarily involves arranging the various primary and secondary elements on a two-dimensional plane, considering their hierarchical relationships. The design process should also take into account the anticipated starting point and reading rhythm of the audience (Xu & Wei, 2009).

- a) One-way visual movement: Unidirectional visual processes encompass three main types: linear, horizontal, and diagonal. Diagonal processes evoke strong impacts and unstable emotional responses, whereas horizontal and linear processes offer stable and serene experiences.
- b) Visualisation of the centre of gravity: By optimising the placement of the visual focal point according to the needs of each project, information can be conveyed effectively (Zhang, et al., 2013).
- c) A repeating visual pattern: Designers utilise repeating patterns to instil a sense of unity, continuity, and rhythm in images. This is accomplished by arranging identical or similar elements in a repetitive visual sequence, enhancing the graphic's distinctiveness and the image's vivacity.
- d) Guided visualisation: Designers employ dots and lines to unify components and create a cohesive visual composition.

- e) Disorganised visual perception: Scattered composition considers screen size by positioning images at various points in the layout and adjusting their density and sparsity to manage visual attention.

Elements of Visual Composition in the Layout of a Poster Design

Poster layouts typically comprise text, images, lines, shapes, and blank space. The configuration of these elements and the realisation of the intended design concept occur through the deconstruction of hierarchy (Hong & Hwang, 2006). Layout design strategically positions visual elements within a grid to effectively communicate a specific message and engage the reader's interest. Müller-Brockmann, a prominent figure in Swiss graphic design, seamlessly integrates the grid concept with his design philosophy. He presents the grid as a methodological system that embodies a designer's organised approach to conceptualising work, demonstrating the use of mathematical thinking to create organised, analyzable, and clear designs that feature a rigorous framework that is both practical and visually appealing (Brockmann, 2016). The application of grid systems entails strict adherence to fundamental principles.

Arrangement of Poster Layout

- a) Alignment: Alignment refers to how a designer creates connections between different elements within a design. Repeating design elements within an image increases visual consistency and the image's ability to capture the reader's attention (Stieger, 2015). Regarding text, designers often prefer justified (aligning text to the left or right edge) or centred alignment (aligning text to the centerline of the design) (Soegaard, 2020).
- b) Visual Hierarchy: In effective layout design, visual elements are arranged to prioritise the most critical focal points within the image. Hierarchy enables the viewer to be systematically guided through the intended sequence of the image. Attributes such as size, colour, contrast, and position are used to emphasise the hierarchy of important elements in the layout.
- c) Contrast, combined with placement and balance, can make a design distinctive and appealing. By integrating various design elements such as contrasting colours, different typographic styles, and diverse aesthetics and moods, a unique and one-of-a-kind product can be harmoniously created.
- d) Visual Balance: Visual balance pertains to the equilibrium of elements within an image. When designing your layout, seek ways to achieve balance in the visual elements on your page, whether through symmetry or balanced asymmetrical arrangements.
- e) Proximity: Proximity concerns the relative closeness of elements within a layout. It enables viewers to easily associate different visual components of a project. The Golden Ratio layout draws from the Golden Ratio (1:1.618), esteemed as a standard of beauty in Greek architecture and influential in social aesthetics (Staff, 2023). In the realm of graphic design, designers often apply the golden ratio to divide pages, and the use of the golden spiral can enhance the visual appeal of images (Gjonbalaj, et al., 2021).

Components of Design Composition

Layout design is composed of five primary elements: text, images, lines, shapes, and white space. These fall into two categories: textual content and visual content. The essential elements of poster design centre around the composition of text, graphics, and images. Text is vital in layout design and includes various components such as titles, subtitles, body text, and appendices; font and design choices significantly affect the visual impact of your layout. A harmonious and inclusive design integrates multiple languages. Moreover, dynamic information ensures that screen elements are suitably aligned. Text placement is crucial for the reading experience, considering human physiology and readability. Text can be positioned in diverse ways within a design: adhering to left alignment, right alignment, centering, slanting, following a pattern shape, utilising colour gradients, or varying in style. Grids facilitate the systematic arrangement of points, lines, and areas within layout elements. The placement of images and graphics within a layout is contingent on an individual's perception of the subject (Xu & Wei, 2009). Accurate communication of information and effective expression of design themes are achieved through precise proportions and distribution of graphics, affording control over the visual impact.

Asian Winter Olympics

At various Winter Olympics hosted in Asia, different symbols, iconography, and mascot designs carry distinct cultural meanings, aesthetic preferences, and generational traits (Olympics Winter Games, 2022). To provide readers with an in-depth understanding of the visual design at the Winter Olympics, researchers have selected information visualisation diagrams that present complex textual information in a clear, comprehensible graphical format.

RESEARCH METHODOLOGY

This study employed qualitative research methods and utilised design thinking (Brown & Wyatt, 2010; Simon, 1969) to create a poster sample in the form of a portrait-style banner. The theme focused on the Winter Olympics in Asia, highlighting events like Sapporo 1972 and Nagano 1998 in Japan, Pyeongchang 2018 in South Korea, and Beijing 2022 in China. However, the colours and images of the emblems and symbols from these Winter Olympic Games were predetermined, so they were not a subject of discussion in this study. Using a purposive sampling method (Campbell et al., 2020), a total of 40 Generation Z design students were invited to discuss their reading direction when viewing this printed poster. Coding categories were developed to analyse the text layout, lines, and white space.

Design Thinking Process for Designing a Sample Poster

Design thinking consists of five phases: empathise, define, ideate, prototype, and test. This study aims to understand users, challenge assumptions, create a prototype, and test it with participating respondents. The five stages are explained as follows:

1. Empathise: The goal was to design a poster to better understand the audience, Generation Z, and their reading directions. The researcher, a college lecturer in China, observed students and engaged in objective discussions with them, noticing their enthusiasm for the Olympics. Recognizing that today's youth spend a significant amount of time looking at monitors and smartphone screens, the researcher was inspired to investigate Generation Z's reading direction when looking at a Winter Olympics poster from Asia

2. Define: The researcher aimed to establish a clear perspective based on an understanding of Generation Z, assessing their interest in printed materials and whether they prefer short and simple texts for content comprehension.
3. Ideate: Creative brainstorming produced three potential solutions involving text layout, lines, and white space. The poster was organised into four sections, each representing one of the Winter Olympic events from 1972 to 2022. The design integrated visual infographics and augmented reality to effectively and artistically emphasise the design implications, cultural significance, and humanitarian aspects of the emblems, mascots, and sports images associated with the Winter Olympics in Asian countries (refer to Figure 1).
4. Prototype: Out of the three concepts, one was selected by three design lecturers, including the researcher. This selected design was a vertical banner-sized poster. The prototype served as a model of the final poster, enabling viewers to identify design flaws and confirm accuracy before the commencement of production (refer to Figure 2).
5. Test: The prototype was distributed to a participant in soft copy format for feedback and as a pilot test to gauge its effectiveness (refer to Table 1, item 1).

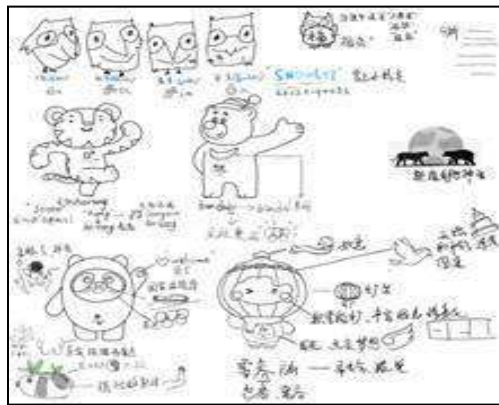


Figure 1. Brainstorming of the graphic elements and rough layout
(Source: Author's personal collection)



Figure 2. Prototype
(Source: Author's personal collection)

Research Population

Forty Generation Z digital media students from a university in Jiangsu Province were invited to participate in a visual survey concerning the aforementioned poster. The researcher presented a colour poster in front of the class. Each participant received an A4 sheet of paper with the poster printed on it and was asked to record and fill in their reading order preferences based on the layout, lines, and white space of the text on the poster. A total of four hours was allocated for participants to complete the task.

DATA ANALYSIS

Raw Data Collected

After excluding the first participant who responded via soft copy, thirty three ($n=33$) valid datasets were collected from the initial 40. The remaining eight datasets were either incomplete or blank and therefore not included in the analysis, resulting in an 83% collection rate (Figure 3).

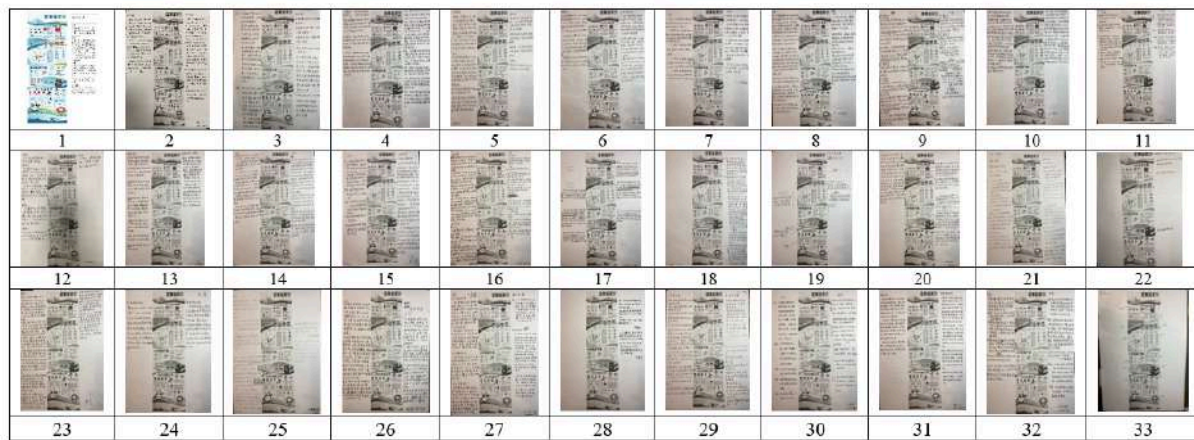


Figure 3. Gen Z responded to the sample poster of the Winter Olympics of Asia
(Source: Author's personal collection)

Content Analysis by Three Industry Experts

The researcher enlisted the expertise of three industry professionals to perform a content analysis on the 33 valid datasets (De Sola Pool et al., 1952). The three experts were (A) a visual communication lecturer at a university, (B) a graphic designer with 11 years of relevant professional experience, and (C) a manager of a design studio with 6 years of professional experience.

Thematic Analysis

This study employed a thematic analysis approach that involved raw data collection, coding, theme development, and report writing (Braun and Clarke, 2006). The researchers manually encoded keywords based on data preprocessing, categorised and combined data according to potential relationships between

keywords, and transformed data into a structured and organised format. Ultimately, thematic concepts related to text layout, lines, and whitespace were identified, qualitative theories were formulated, the research questions were addressed, and the findings were summarised. The data were organised using first-order codes, second-order dimensions, third-order themes, and aggregate dimensions (Figure 3).

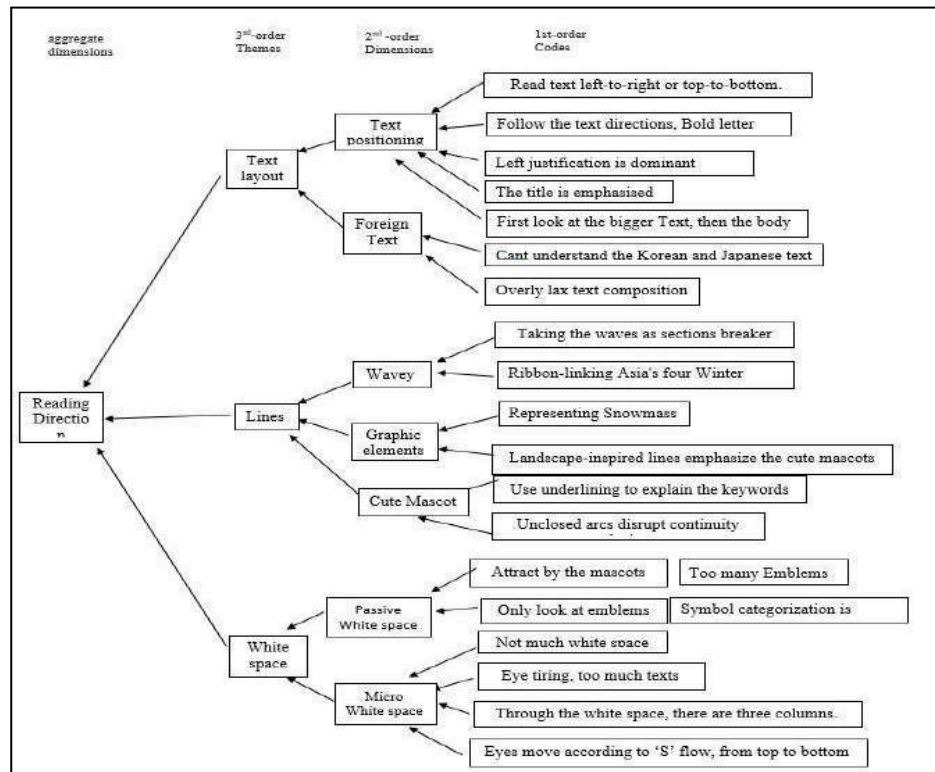


Figure 3. Thematic analysis of reading direction of the Winter Olympics Asia Poster

CONCLUSIONS

Text layout, lines, and whitespace provide a navigational guide for the audience's eyes. Typically, in a Z-layout, readers scan from the top left to the top right, then to the centre, and from the bottom left to the bottom right corner. This study applied thematic analysis to the valid data content reported by 33 participants, from coding to theming to dimension aggregation.

Rayner et al. (2001) suggested that reading is accomplished by processing words letter by letter. However, in this study, the poster was in Chinese. To read Chinese characters, one must understand the basic radicals or decompose them into components to read and comprehend the Chinese words on the poster. This was not an issue since all participants were Chinese. However, the inclusion of Japanese and Korean words caused confusion during reading. Additionally, the layout design featured interconnected ribbon lines, which made segregating different sections challenging, but elements and icons like snowflakes and skiers were well-received. Regarding whitespace, participants appreciated wavy elements that helped divide sections and isolate text blocks, enhancing fluidity and readability. The researchers also observed that Generation Z's preference for short, simple texts has become a standard, causing participants to favour images over text.

Moreover, although some participants were inclined to scan the posters with their mobile phones to

obtain information, they were not informed that this was possible through an interactive app. The research implication of this study is that incorporating engaging images and graphics, as well as effective use of text layout and whitespace, can capture the attention of Generation Z viewers, potentially increasing the time they spend on a page. For practical implications, designers might consider substituting detailed text with visual formats, such as integrating an interactive application that allows users to scan images or symbols on posters to view short videos, which suits the lifestyle of Generation Z. This exploratory study provides an analytical process of Generation Z's reading orientation and serves as a reference for future research.

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Practice-Based Lessons in Photographic Education: An Alternative to Photo Image Development

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ABSTRACT

The utilisation of contemporary photography technology facilitates rapid knowledge acquisition and enhancement of several aspects. Nevertheless, the fundamental process of picture-making needs to be adequately emphasised, resulting in a negligent approach and a lack of comprehension among students regarding the significance of generating high-quality images. This practice-based lesson aims to elucidate to students the fundamental relevance of picking picture image designs as a precursor to producing impactful photography. The chosen topic for creating artistic works is around nature and is centred on the Malacca campus. The PCT256 - Contemporary Photography Practice course selection at Universiti Teknologi MARA was based on its alignment with the initial approach, which involves creating artwork through various photographic processes. The subsequent topic, assessment analysis, will use the scoring rubric to assess the student's comprehension of the material. The fabrication of 58 pieces involved a total of 29 students. This essay will address the production process's various difficulties, problems, and challenges. The research findings indicate that students have a more significant potential for comprehending the process when they engage in iterative attempts to produce optimal outcomes.

Keywords: *Practice-based lessons, alternative photographic processes, picture-making, Cyanotype, Chlorophyll Print.*

INTRODUCTION

The widespread adoption of digital photography technology may lead to decreased scientific research and understanding of chemical photography. The alteration in question may result in the loss of significant knowledge about past artistic, commercial, and experimental photographic processes and technologies. The nature of students who are too dependent on technology causes a lack of critical thinking to carry out the responsibility of learning the process of producing images creatively and proactively. Students will need more ability to solve problems, and at the same time, the lack of information from limited technological advantages will also limit students' active ability to solve problems.

The widespread adoption of digital photography technology may lead to decreased scientific research and understanding of chemical photography. The alteration in question may result in the loss of significant knowledge about past artistic, commercial, and experimental photographic processes and technologies. The nature of students who are too dependent on technology causes a lack of critical thinking to carry out the responsibility of learning the process of producing images creatively and proactively. Students will need more ability to solve problems, and at the same time, the lack of information from limited technological advantages will also limit students' active ability to solve problems.

Our study aims to provide a paradigm that prioritises instructional methods, in contrast to the prevailing body of literature on practised-based learning (PBL) that primarily emphasises curricular aspects. This program is based on the scholarly work of multiple teacher educators who have endeavoured to facilitate the development of innovative teaching techniques that can positively impact all students, particularly those who have previously faced educational disadvantages (Grossman et al., 2018; Loewenberg Ball & Forzani, 2009). The effort is being made by the subject course's resource person in the hopes that future educators will act as mediators to reveal the aesthetic of the traditional photographic technique, particularly in Malaysia. Therefore, prospective educators must not only be able to employ solid instructional approaches effectively but also to engage students in the learning process in the classroom.

LITERATURE REVIEW

Incorporating different supports and materials in the capture of light contributes to the overall message conveyed by the photo object and, under specific conditions, introduces an additional level of interpretation for the spectator. It is critical to evaluate the elements involved in creating an image, including the subject matter photographed, the photosensitive material used to capture it, and the media onto which the resulting image will be transferred.

Practice-Based Lessons in Photography

In practice-based research, the research and the practice function as complementary and interdependent processes that produce new and original forms of knowledge. It is a disciplined method for doing research by applying knowledge (Candy et al., 2021). Practice-based learning has emerged as a cornerstone in photography education (Curtis et al., 2021; Hasse, 2014; Pour et al., 2022), offering a dynamic framework for students to integrate theoretical knowledge with hands-on experience (Marougkas et al., 2023). The idea of experiential learning is fundamental to practice-based learning in photography., (CARR et al., 2019; Romano et al., 2022). According to this theoretical framework, individuals acquire and enhance their abilities by engaging in a cyclical progression of tangible experience, reflective

observation, abstract conceptualisation, and active experimentation. Within photography, this concept pertains to the cyclical procedure of obtaining visual representations, engaging in a meticulous assessment of the outcomes, and enhancing one's methodologies.

The studio setting functions as a central hub for the acquisition of practical knowledge in the field of photography. The concept of the "reflective practitioner" proposed by Schön (1987) holds particular relevance, as it underscores the importance of continuous reflection and critical analysis in the advancement of artistic growth (Guo, 2022; Hartmann et al., 2023; Tan et al., 2023). The iterative feedback cycle, commonly supported by group critiques and individual coaching, fosters the development of students' visual language and technical proficiency (Brill, 2016; Gurbuz & Celik, 2022; Hennessy et al., 2022). During field activities, students must put their skills to the test (Dalinger et al., 2020). Therefore, leading a group discussion and soliciting and understanding individual thought were two examples of practical preparation that must be included in university courses (Matsumoto-Royo & Ramírez-Montoya, 2021).

Moreover, there has been an increased emphasis on interdisciplinary inquiry in contemporary scholarly works. This approach promotes the exploration of diverse genres, styles, and techniques among photography students, broadening their creative range and fostering novel approaches to image creation (Gurbuz & Celik, 2022). The involvement of other disciplines in this context not only cultivates artistic adaptability but also equips students with the necessary skills to navigate the varied challenges of the modern photography industry.

Technology and digital tools are crucial in implementing practice-based learning (Neumann et al., 2021) within modern photography education. The emergence of digital photography has brought about a significant transformation in the field, requiring photographers to possess versatile and flexible technical abilities. This statement follows Wenger's (1996) theory of communities of practice, highlighting the significance of collective learning and the collective examination of developing technologies within the photography community. Practice-based knowledge plays a crucial role in photography education as it facilitates the growth of photographers with technical proficiency, creative ingenuity, and professional adaptability (Mathee, 2022; Papademetriou et al., 2022). Photography educators empower students to navigate the dynamic and ever-evolving world of visual narrative and image production through the adoption of experiential learning, cultivation of reflective practices within the studio, promotion of interdisciplinary exploration, and incorporation of emerging technology (Allard, 2020; Salazar, 2021; Thevenin, 2022).

Alternative Photographic Process

Alternative photography printing is a very imaginative process, mainly due to its capacity to engage with and modify diverse surfaces and objects (Markham, 2021; Opitz, 2022; Post, 2022). The notion and visual representation augment the significance of the physical artefact, endowing it with an unmistakable sense of tangibility (Markham, 2021). The thing in question has remained relatively vital, but it may need to improve its practicality (CARR et al., 2019). However, it is already preferred to follow with a foundation of its significance. It is critical to foster students' understanding of the essential role of photography in producing compelling images that are judged credible for informational purposes (Markham, 2021; Post, 2022).

The realm of alternative photography practices encompasses various techniques and approaches that actively question and disrupt conventional understandings of creating images. This review synthesises relevant material about alternative photographic methods, focusing on their historical origins,

inventive methodologies, and present-day significance. The platform provided by the organisation facilitates opportunities for artists to engage in experimentation, express their vision, and deviate from traditional photographic conventions. As modern practitioners persist in exploring and innovating within this domain, alternative photography maintains its vibrancy and relevance as a distinct part of the more fabulous photographic scene.

- I. *Historical Roots and Evolution:* The historical beginnings and evolution of alternative photography techniques can be traced back to the experimental endeavours in photography during the 19th century. Prominent figures such as William Henry Fox Talbot (Brusius et al., 2013) and Anna Atkins (Isenogle, 2019) established the fundamental principles underlying alternative photographic techniques, including cyanotypes and salted paper prints. The methods mentioned above were distinguished by their experiential methodology and unique visual attributes.
- II. *Cyanotype and Van Dyke Brown:* The cyanotype technique, which involves using iron salts in contact printing, and the Van Dyke Brown process, which utilises iron-silver salts, have garnered renewed attention in recent years (Politarhos, 2020, 2022). The accessibility of literature is often emphasised, along with its ability to evoke distinctive blue and brown hues. These procedures allow artists to engage in experimentation and show their individuality.
- III. *Platinum-Palladium and Gum Bichromate:* Platinum-palladium printing, renowned for its exceptional tonal range and long-lasting quality, has attracted modern practitioners searching for a more archival option than conventional black-and-white printing techniques (Golaz, 2021). The gum bichromate printing process encompasses a mixture of gum Arabic, pigment, and dichromate, which facilitates the creation of painterly effects and imparts a visually intricate and multi-dimensional quality to the final output.
- IV. *Pinhole and Cameraless Photography:* Pinhole photography, which traces back to the earliest attempts with camera obscura, continues to attract contemporary artists (Politarhos, 2020). The field of literature places significant emphasis on the inherent simplicity and potential for serendipitous outcomes associated with creating pinhole images (Politarhos, 2022). Cameraless photography, a technique that rejects conventional cameras in favour of direct exposure approaches, presents a departure from established norms and promotes the investigation of light-sensitive materials (Post, 2022).
- V. *Chemigrams and Lumen Prints:* Chemigrams and lumen prints are two contemporary alternative approaches that expand the possibilities of photographic technology (Wilks, 2015). Chemigrams encompass the deliberate alteration of photographic paper by applying diverse chemical substances. Conversely, lumen prints rely on the direct interaction between plant materials and photographic paper, producing delicate and naturalistic visuals (Morrison, 2023). These procedures exemplify the experimental characteristics inherent in alternative photography (Enfield, 2020).
- VI. *Digital Emulation of Analog Processes:* The current scholarly discourse explores integrating digital technology with analogue processes (Castellano & Vessio, 2021; Lynch & Edgerton Jr, 1987; Prokopovych et al., 2023). Contemporary artists can emulate the visual attributes associated with alternative procedures digitally. Integrating traditional and modern technologies broadens the creative potential of anyone involved in picture creation (Prokopovych et al., 2023).

Alternative Photography Practice-Based Lesson Assessment

The assessment of lessons based on practice in photography education is of utmost importance as it enables the evaluation of student learning outcomes and facilitates the provision of constructive feedback to promote growth and development (Alajmi, 2019). Evaluating photography education lessons grounded in practical application necessitates a comprehensive strategy incorporating many approaches, including authentic assessment, criterion-referenced assessment, and process-oriented assessment. The utilisation of rubrics, peer and self-assessment, and reflective activities serves to enhance and augment the assessment process. By implementing these tactics, educators can empower photography students to actively participate in their creative process and attain significant learning results.

- I. **Authentic Evaluation:** Using authentic evaluation methods, including portfolio reviews, exhibitions, and publication chances, has become increasingly prominent within photography education (Hanifah & Irambona, 2019). These methodologies allow students to demonstrate their work within authentic, real-world settings, facilitating a thorough assessment of their technical proficiencies, creative abilities, and conceptual comprehension (Hanifah & Irambona, 2019; Sotardi & Dutton, 2022).
- II. **Criterion-Referenced Assessment:** Criterion-referenced assessment is a form of evaluation designed to fit with predetermined learning objectives and criteria for each assignment or project (Sternberg et al., 2022). The methodology above guarantees that students are assessed per pre-established norms of competency, facilitating a clear and unbiased evaluation of their academic performance (Pui et al., 2021).
- III. **Process-Focused Evaluation:** Given the iterative nature of alternative photography, evaluation should include the final product and the developmental stages. Evaluating students' abilities to experiment, iterate, and problem-solve during the creative process provides a complete view of their path (Lee & Lee, 2020).
- IV. **Feedback-Rich Environment:** Constructive criticism is essential in alternative photographic education. It enables pupils to identify their strengths and areas for development (Himmetoglu et al., 2020). To foster a culture of continuous development, it is imperative to consistently tailor the feedback process to meet the unique needs of each student. (Byrd & Alexander, 2020; Rahmatullah et al., 2022).
- V. **Peer and Self-Assessment:** Peer and self-assessment are practical tools for fostering students' capacity to critically evaluate their and peers' work (Stančić, 2021). This methodology enables active participation in the evaluation standards and cultivates a culture of constructive criticism within the educational community (Dahal et al., 2022; Dutta et al., 2023).
- VI. **Reflective Practice and Journals:** Practising reflective activities, such as learning journals or reflective essays, fosters the articulation of students' artistic intents, decisions, and growth within the context of the alternative photography process (Kim & Li, 2021). Engaging in self-reflection facilitates the development of metacognitive skills and enhances individuals' comprehension of their ever-evolving artistic identity (Vernon & Paz, 2023).
- VII. **The Importance of Formative Assessment and Feedback Loops:** Emphasising formative assessment, an ongoing process integrated within the learning experience, facilitates the provision of timely feedback that steers students towards enhancing their performance (Vernon

& Paz, 2023). Implementing feedback loops encourages continuous discourse and aids students in improving their academic output (Bishop & Allford, 2019).

RESEARCH METHODOLOGY

The research was conducted in two distinct phases. The first stage of the study focused on comprehending the process of creating images on a sensitive surface. The second stage of the study was synthesising findings related to students' understanding of making the image and enhancing experiential learning and improvement.

For stage 1, we considered several alternative methods for traditionally generating images, following the original photographic photography techniques (Post, 2022). The Daguerreotype and Collodion processes, which involve the application of sensitive chemistry onto a surface to produce an image, are widely known and continue to be employed in contemporary practice. The resultant image exhibits heightened artistic qualities, using somewhat costly, less secure, and less readily available materials. Another alternative photographic technique that utilises non-toxic chemicals, specifically cyanotype, has been selected due to its greater accessibility, enhanced safety, and affordability for student use. Another strategy employs natural resources and undergoes the inherent process of photosynthesis. The process under discussion is Chlorophyll Print, wherein the resultant image results from the leaf surface's exposure to sunlight. This exposure induces a yellow colouration in the exposed areas, while the unexposed regions retain their green hue. The Cyanotype and Chlorophyll Print processes employ the sun as the primary medium for picture formation through exposure. The primary aim of this practice-oriented lesson is to foster students' ability to identify and comprehend the process of image production.

Before beginning the Cyanotype and Chlorophyll Print processes, students must record high-contrast images while retaining line details. Pictures that are under or overexposed will be withdrawn from consideration since they do not match the photography criteria. The image will then be printed in positive and negative form on transparent paper. The negative image will be utilised in the cyanotype process, while the positive image will be used in the chlorophyll print. The subjects for the photographs are based on natural resources and artefacts associated with the state of Melaka.

In stage 2, the artwork created by the students must achieve the desired outcomes. Students must adhere to the procedure exemplified by the instructor to achieve good results. In the event of an unsuccessful work, the learner will engage in iterative attempts until reaching the desired outcome of generating an image. This instructional material aims to facilitate students' comprehension of the fundamental procedures involved in generating visual representations. The artwork produced by the student will be assessed based on the criteria developed by the Resource Person to evaluate the student's comprehension of the fundamental process of image creation.

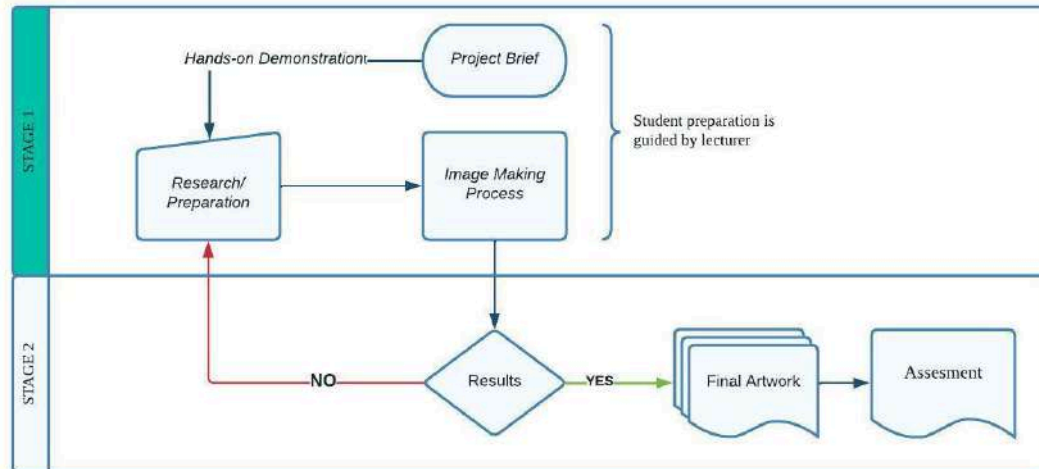


Figure 1. The research design process

The process of preparing and planning

The practice-oriented courses were specifically developed to incorporate various photographic techniques, styles, and creative approaches. Every session was meticulously designed with well-defined learning objectives, anticipated results, and precise assessment criteria. The aforementioned activities occurred inside a controlled studio setting, which offered an optimal atmosphere for engaging in practical experimentation and fostering the development of artistic creativity. Every educational session encompassed demonstrations, practical exercises, and individual project assignments, facilitating a complete learning experience.

A fundamental element of the methodology entailed methodical observations conducted during these experiential sessions to record the students' behaviours, strategic selections, and decision-making procedures. The comprehensive documentation method meticulously gathered field notes, photographs, and videos. Additional qualitative data sources were utilised to visually document the progress and endeavours of the students.

In addition, the educational process included many opportunities for reflection and debriefing, enabling students to articulate and exchange their newly acquired knowledge and insights gained from experiential teachings. This change proved to be of great value for students as it allowed them to reinforce their knowledge and enhance their comprehension of the subject matter. The curriculum demonstrated careful consideration in its creation, aiming to provide a thorough and engaging educational experience in photography. It successfully integrated theoretical concepts, practical applications, and opportunities for reflection, resulting in a holistic approach to learning.

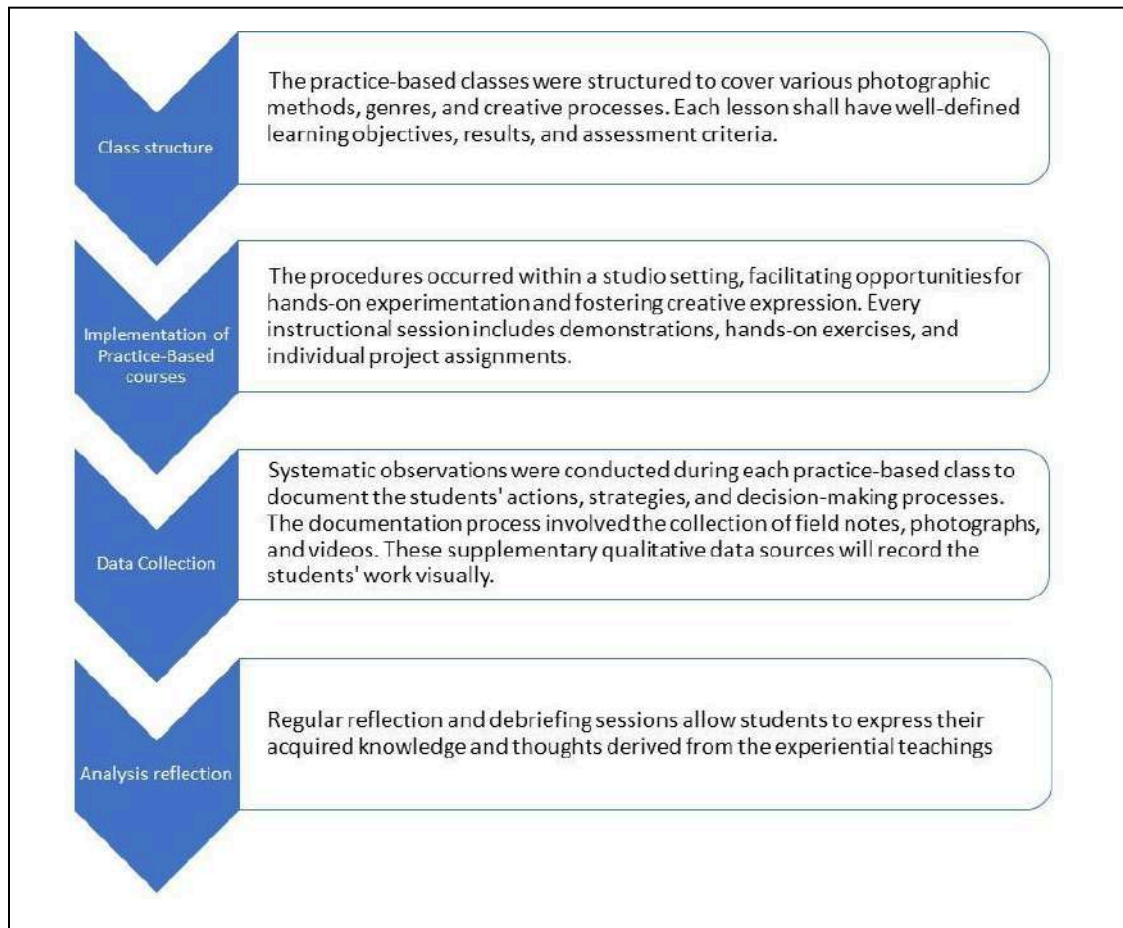


Figure 2: The process of preparing and planning.

The Cyanotype Process

The sequential procedures encompassed in alternative photography include the mixing of chemicals, the preparation of substrates, the printing of images, the processing of the prints, and the subsequent drying of the final product (Politarhos, 2020). Cyanotype is the process of combining two chemicals, potassium ferricyanide and ferric ammonium. Completing the chemical blending process ascertained the preparedness of the printing surface. In the context of the course, students exclusively utilised paper as their medium of choice. However, it is worth noting that any receptive surface, including but not limited to cotton, wool, or canvas, has the potential to be employed for artistic purposes (Post, 2022). Applying the chemical mixture onto the surface of the paper and its subsequent even distribution is facilitated by using a paintbrush. It is imperative to ensure that the paper is subjected to a dark environment to dry after applying the chemical (Politarhos, 2022).

Traditionally, a cyanotype print is subjected to solar exposure, while modern printing technology has introduced alternatives such as a lightbox or UV exposure unit (Post, 2022). The selection of the light source will significantly influence the duration of exposure. After being adequately exposed to light, the print was immersed in a water bath and air dry. Students were encouraged to develop the ability to make sensitive papers to comprehend the concept of image production on a surface. They will investigate how illumination affects the appearance of an image on sensitive materials. The duration and intensity of the

exposure may cause dyes and colourants to diminish or change colour. By exposure to ultraviolet radiation, paper and other organic materials weaken, bleach, and yellow.

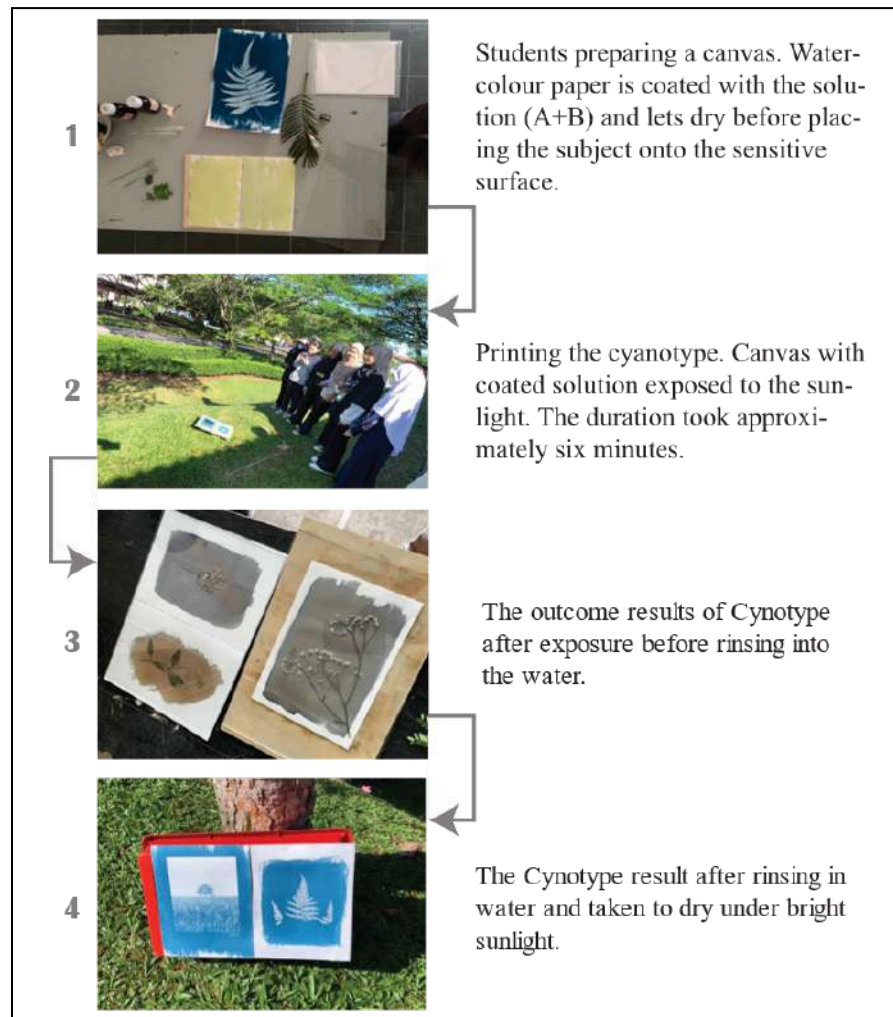


Figure 3. The steps in making the Cyanotype Process

(Source: Author's personal collection)

The Chlorophyll Print Process

The concept of chlorophyll printing technology involves using digital and analogue processing to create a picture through photosynthesis (Basuki, 2015). Engaging in an experiment that explores the effects of shifting sunshine, exposure durations, and diverse leaf specimens can provide a gratifying and humbling means of connecting with the natural world within artistic endeavours. This proposed educational program aims to enhance the comprehension of photography principles and fundamental photographic printing techniques among students pursuing photography (Dona Lowii et al., 2016).

Students need to get a bag of leaves from their residences. Previous research has indicated that vegetable leaves possess a substantial amount of green chlorophyll compared to leaves of other plant varieties. It has been determined that leaves with a waxy texture should be avoided due to their increased

resistance to compression and prolonged duration for chlorophyll release (Niklas & Spatz, 2012). Like the anotype method, the chlorophyll process is an organic alternative to photography. However, the prints are directly bleached by sunlight onto the surface of leaves using a positive instead of printing on the crushed fruit or plant matter extract (Niklas & Spatz, 2012). The task will teach students how to use local plants' organic, natural characteristics to create visuals.

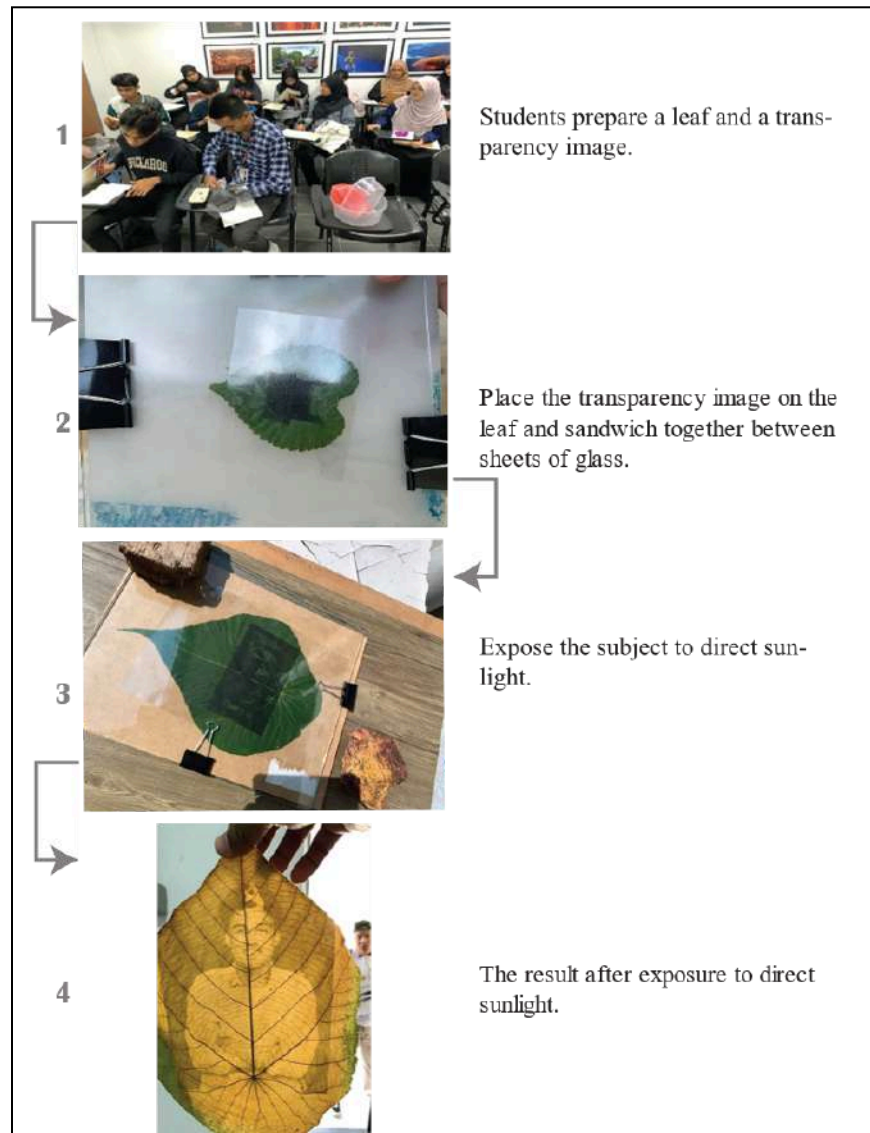


Figure 4. The steps in making the Chlorophyll Print Process
(Source: Author's personal collection)

FINDINGS

The overall group of students demonstrates a keen interest in engaging in the above-mentioned activity due to its incorporation of extracurricular activities. Students derive greater enjoyment from engaging in outdoor exercises instead of being confined to the classroom, solely engrossed in reading books or

engaging in minimal physical movement (Guardino et al., 2019; Hellison, 2000; Mullins et al., 2019). The observation findings indicate that students exhibit heightened concentration and engage in constructive competition to achieve optimal outcomes. Facilitate the seamless operation of the teaching and learning process through indirect contributions. Students gain a deeper comprehension of the fundamental aspects of photography photographs by creating their images instead of solely acquiring theoretical knowledge.

Table 1. Student's performance in making photographic images using the alternative process of image making.

Student	The ability to achieve the outcome	
	Cyanotype Print	Chlorophyll Print
1	Yes	Yes
2	Yes	Yes
3	Yes	Achieved on the third try because of weather condition
4	Yes	Yes
5	Yes	Achieved on the second try, but only a light image appears
6	Yes	Achieved on the second try because of weather condition
7	Yes	Yes
8	Yes	Yes
9	Yes	Yes
10	Yes	Yes
11	Yes	Yes
12	Yes	Achieved on the third try because of weather condition
13	Yes	Yes
14	Yes	Yes
15	Yes	Yes
16	Yes	Yes
17	Yes	Yes
18	Yes	Achieved on the second try because of weather condition
19	Yes	Achieved on the second try because of weather condition
20	Yes	Yes
21	Yes	Yes
22	Yes	Yes
23	Yes	Yes
24	Yes	Yes
25	Yes	Achieved on the second try because using dry leaf
26	Yes	Yes
27	Yes	Yes
28	Yes	Yes
29	Yes	Yes

The findings suggest that students successfully succeeded in the Cyanotype and Chlorophyll print processes. The notable aspect of Cyanotype prints lies in the ease with which the intended effect can be achieved, as evidenced by the proficient demonstrations of all students. On the other hand, Chlorophyll prints, although they achieved considerable success, exhibited a somewhat elevated level of variability

since three students faced difficulties associated with weather conditions. However, by repeated efforts, they were able to attain favourable results.



Figure 5. The results in making the Cyanotype Print Process.
(Source: Author's personal collection)

The students demonstrated high proficiency in generating images during their initial attempts to execute the Cyanotype process. The procedure employs established chemical principles, and students comprehensively understand production methodologies. Students acquire a comprehensive comprehension of the phenomenon wherein pigments undergo a colour transformation upon exposure to sunlight, as well as the mechanism by which an image materialises through the combination of exposed and covered areas, resulting in the formation of distinct shapes and lines that constitute the image. The strategy employed in imparting knowledge to students is a fusion of traditional and contemporary photographic methodologies. Art and design students can apply their knowledge by actively engaging in experimentation and exploring the diverse outcomes that can be achieved via unintentional and deliberate actions.



Figure 6. The results in making the Chlorophyll Print Process
(Source: Author's personal collection)

Students who were unsuccessful in their initial attempt to produce an image are likely to achieve success in subsequent shots, as their lack of success might be because of the improper timing of the chlorophyll print process concerning weather conditions. Intense sunlight is essential for the Chlorophyll Print process to initiate photosynthesis. Following the subsequent endeavour, the visual representation is generated. When queried about their comprehension of the incident, their response centred on the essential function of sufficient lighting in image formation. The deficiency of light results in the failure of an image.

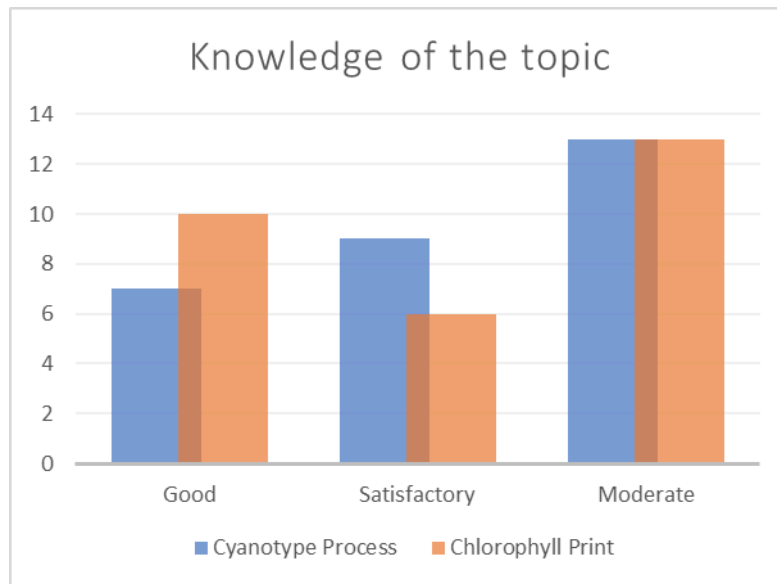


Figure 7. Based on the rubric's trait, students understand the specified topic before the process.

The data analysis reveals that a significant proportion of the shows, precisely 44.8%, can be categorised as moderate regarding their treatment of the cyanotype process. This is followed by 27.5% of shows deemed satisfactory, 24% considered good, and 3.4% classified as poor. In the case of chlorophyll print subjects, the results indicate that 44.8% of the samples were classified as intermediate, 34.4% as good, 17.2% as satisfactory, and 3.4% as poor.

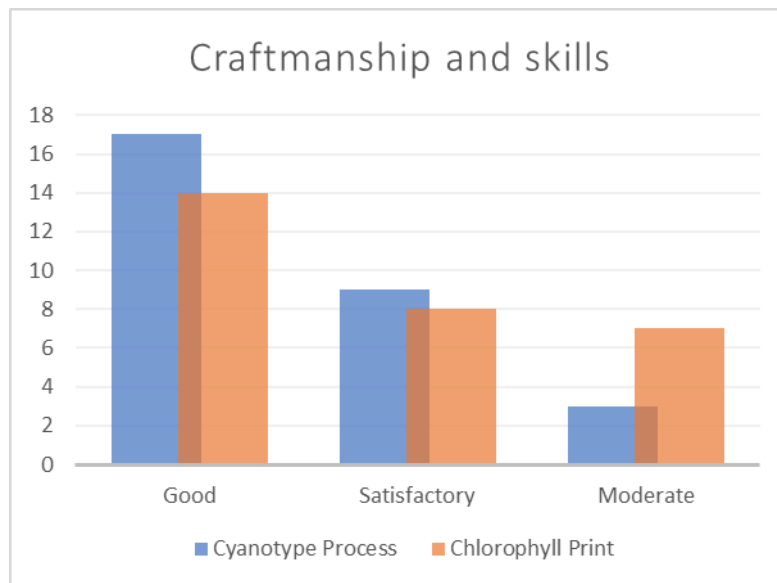


Figure 8. Student's craftsmanship and skills

Concerning the skills presentation, the findings indicate that 58.6% of individuals demonstrated a commendable level of craftsmanship in their understanding and execution of the cyanotype process. Additionally, 31% of participants achieved a satisfactory level of proficiency, while 10.3% exhibited a

moderate level of skill. In the case of the chlorophyll print theme, the data indicates that 48.2% of the samples had a high level of craftsmanship, 27.5% were deemed satisfactory, and 24% had a moderate level of craftsmanship.

Table 2: Subject matter selection for practising the image-making process

Subject Matter		
Student	Cyanotype Process	Chlorophyll Print
1	Photogram (Leaf)	Portrait
2	Digital Negatives (Architecture)	Portrait
3	Photogram (Leaf)	Portrait
4	Photogram (Leaf)	Architecture
5	Photogram (Leaf)	Landscape
6	Photogram (Leaf)	Architecture
7	Digital Negatives (Portrait)	Landscape
8	Digital Negatives (Portrait)	Architecture
9	Digital Negatives (Landscape)	Landscape
10	Digital Negatives (Architecture)	Architecture
11	Photogram (Leaf)	Landscape
12	Photogram (Leaf)	Architecture
13	Photogram (Leaf)	Landscape
14	Photogram (Leaf)	Portrait
15	Photogram (Leaf)	Architecture
16	Digital Negatives (Landscape)	Architecture
17	Digital Negatives (Architecture)	Architecture
18	Digital Negatives (Architecture)	Architecture
19	Digital Negatives (Architecture)	Architecture
20	Digital Negatives (Architecture)	Architecture
21	Digital Negatives (Architecture)	Architecture
22	Digital Negatives (Architecture)	Architecture
23	Digital Negatives (Architecture)	Architecture
24	Digital Negatives (Architecture)	Architecture
25	Digital Negatives (Landscape)	Landscape
26	Digital Negatives (Landscape)	Landscape
27	Digital Negatives (Landscape)	Landscape
28	Digital Negatives (Landscape)	Landscape
29	Digital Negatives (Landscape)	Landscape

A study found that most students, precisely 65%, utilised digital negatives for their artistic endeavours. Among these students, 34.4% focused on architecture, 24% on landscapes, and 6.89% on portrait photography. Conversely, 34.4% of students chose photogram methods as their primary subject matter when exploring the cyanotype process. In the case of the chlorophyll print theme, the data reveals that most students, precisely 51.7%, opted to utilise architecture as their primary subject matter. Followed by 34.4% of students who chose landscape as their subject, while a mere 13.7% selected portrait as their subject matter.

CONCLUSION

This study presents empirical evidence supporting the viability and efficacy of alternative photographic techniques, namely Cyanotype and Chlorophyll prints, within an educational setting. Although significantly more varied, most pupils successfully used Chlorophyll prints, but Cyanotype prints proved reasonably accessible. Using alternative methodologies presents significant prospects for fostering creative expression and promoting environmental sustainability within photography education.

In summary, before the commencement of the class, most students (44.8%) had a moderate awareness of the specified issue. The global proliferation of digital technology has resulted in a decline in the popularity of alternative picture-making methods in contemporary times. In addition, individuals needing a comprehensive grasp of disciplines such as photography, chemistry, or painting may encounter increased challenges in comprehending the cyanotype process.

Subsequently, following the practical demonstration conducted by the instructor, students exhibited heightened enthusiasm for image creation through unconventional means. The craftsmanship and skills are evident. Table 3 illustrates that a significant proportion, around 50%, of the students exhibited proficiency in creating images by utilising the cyanotype process and chlorophyll print techniques. One effective strategy for enhancing student engagement and cultivating interest in a particular subject involves using practical experiments as a demonstrative tool. It facilitates the active participation of individuals in learning, fosters the integration of theoretical knowledge with practical application, and often leads to a deeper understanding of the subject matter.

The subject matter indicates that students are more inclined to use transparency films for each topic, primarily due to the accessibility of tools, such as printers capable of producing transparency films. The photogram technique was readily accessible within the school vicinity for capturing subjects, focusing on leaves.

The Cyanotype and Chlorophyll Print techniques are artistic procedures that use elements of creativity in the production of images. Engaging in visual art creation through these techniques elicited excitement and a sense of fulfilment among students, potentially enhancing their interest, particularly in photography. The collaborative nature of the experiment likely fostered a sense of enjoyment among students as they engaged in collective idea-sharing and mutual learning, augmenting the activity's overall attractiveness.

Additional avenues for exploration in future studies could encompass the potential integration of these alternative methods within the broader framework of the photography curriculum. Furthermore, it would be beneficial to analyse other elements that may influence the success rates of these processes, such as using different types of plant material for Chlorophyll prints. Plus, it would be beneficial to

conduct a longitudinal study to evaluate the extent to which individuals retain and apply the abilities they have acquired from alternate image-making processes over an extended period.

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