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The Development of an Artificial Intelligence Technology Teaching Model to Improve Secondary School Student's Creativity Skills During Ideation Process in Visual Arts Education (VAE) Subject: A Need Analysis

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ABSTRACT

This study explores the need for developing an integrated Artificial Intelligence (AI) technology teaching model to enhance secondary school students' creativity during the ideation process in Visual Arts Education (VAE). The research focuses on addressing challenges faced by VAE teachers in Malaysia, particularly in the Kajian Rekaan Seni Visual (KRSV) component of the Sijil Pelajaran Malaysia (SPM) examination. Employing a quantitative methodology, the study utilized a survey questionnaire administered to sixty-eight VAE secondary school teachers in Selangor. Data analysis, conducted using descriptive statistics to examine means and frequencies, revealed that a significant majority of teachers acknowledge the necessity to enhance students' creative competencies and recognize inefficiencies in the current ideation process. Teachers report that students heavily rely on provided examples and experience stress during ideation, potentially contributing to increase the numbers of dropouts addressed as 'T' students. The study identifies a strong demand for AI-integrated approaches to facilitate a more effective ideation process and provide personalized guidance to students. Based on these findings, the researchers propose the development of an 'Ideation Intelligence' model, which aims to integrate AI technology with the current ideation methods. This model seeks to reduce ideation time while enhancing the quality of creative outcomes, ultimately fostering students' creative growth and preventing dropouts from KRSV.

Keywords: Artificial Intelligence, ideation process, need analysis, Visual Art Education, creativity

INTRODUCTION

Students' creativity during the ideation phase of Kajian Rekaan Seni Visual (KRSV) is important for generating original and unique ideas (Mccrae, 1987), solving problems, and creating valuable new products (Tomc & Kočevar, 2020). KRSV, also known as Paper 3 for Visual Art Education (VAE) subject in the Sijil Pelajaran Malaysia (SPM) examination, is a mandatory component for eligibility to sit for Papers 1 and 2 during the SPM examination period. KRSV is a project-based assessment spanning six months, commencing in May and concluding in October, comprising four distinct processes (Table 1). This paper focuses on the ideation process, which demands creative input from students in developing ideas, making evaluative decisions, and finalizing designs. This process is crucial to the design project, accounting for 35 marks of the overall assessment. Within the allocated timeframe, students must complete all processes. Failure to submit the portfolio and product results in disqualification from the VAE SPM examination, with such students designated as 'T' students. To

mitigate the number of 'T' students, this research aims to explore the potential integration of AI technology in teaching the ideation process, potentially enhancing the effectiveness and efficiency of the creative process.

Table 1 *Details of the proposed timeline and marks allocation for the progress of KRSV work*

Bil.	Aspek	Markah Progres						Jumlah	Markah Penuh	Skor %
		Mei	Jun	Jul	Ogs	Sep	Okt			
1	Pewujudan Idea (Conceptual process)								10	
2	Pengolahan idea (Ideation process)								35	
3	Penerokaan Media (Media exploration)								25	
4	Penghasilan Karya/Produk (Product / artwork)								25	
5	Nilai dan Apresiasi (Attitude value)								5	
JUMLAH MARKAH									100	
GRED PENCAPAIAN										

Source: Borang Proses Kerja Murid KRSV Lembaga Peperiksaan Malaysia

Recent advancements in AI technology have profoundly influenced VAE subject, particularly through the introduction of Image Generative Model. This model which utilize text-to-image prompts, allow for the rapid generation of high-quality visual content based on textual descriptions (Dehouche & Dehouche, 2023). This capability offers students a novel tool to explore and expand their creative ideas, potentially inspiring new directions in their ideation process particularly in KRSV. However, it is crucial to emphasize that AI should be viewed as a complementary tool rather than a replacement for creativity process. The proposed 'Ideation-Intelligence' teaching model aims to incorporate AI technology in a structured manner, leveraging its potential to stimulate creative thinking while maintaining the essential role of human input and creative judgment (Brisco et al., 2023). By carefully designing prompts utilizing the structure that combines primary and secondary elements forms a textual statement to obtain the desired image (Dehouche & Dehouche, 2023).

The structure that form prompts to generate visual images are fundamental to the development of a teaching model for 'Ideation Intelligence' in future research phases. The integration of AI technology in the ideation process has the potential to enhance students' creativity and improve their ability to complete KRSV projects within the allocated timeframe. This, in turn, could lead to a reduction in the number of 'T' students who fail to complete the KRSV component. In order to integrate the AI technology into current teaching methods employs by the VAE teachers, we need to conduct a need analysis study at the initial stage, particularly in the KRSV context. This need analysis have three main objectives. Firstly, is to examine the creativity levels of Paper 3 candidates as perceived by their teachers, providing insight into current student performance. Secondly, the study seeks to identify and analyse the teaching methods currently employed by VAE teachers during the ideation process, offering a comprehensive view of existing teaching practices. Lastly, the study investigates the necessity for developing a novel teaching model designed to enhance students' creativity specifically within the ideation process. By exploring these interconnected aspects, this need analysis aims to provide a foundation for potential improvements in VAE instruction, particularly in fostering creative thinking and idea generation among students.

METHODOLOGY

This need analysis study involved conducting a questionnaire survey to assess a need analysis among participants comprising VAE teachers. To facilitate this data collection, the questionnaire was distributed using Google Form and disseminated via emails and group messages to all secondary schools VAE teachers, which provided a convenient and efficient method for garnering responses across

diverse educational context. The aim was to ascertain their requirements for developing a teaching model integrated with AI technology in the illustration ideation process, named as 'Ideation-Intelligence' teaching model. Initially, researchers are required to obtain approval from the Education Research Application System (ERAS) of the Malaysian Ministry of Education (MOE) to conduct surveys that involved secondary schools teachers via online platform. The questionnaire has twenty-three questions and encompasses five distinct sections. Section A pertains to gathering demographic information, Section B delves into teachers' perceptions regarding their students' creativity levels during the illustration ideation process, Section C focuses on the current teaching approaches employed, particularly aimed at enhancing students' creativity skills, Section D is geared towards addressing the necessity of developing a novel teaching model to augment students' creativity skills during the ideation process and Section E serves as an open-ended section for eliciting personal opinions on teaching methods for the ideation process.

RESULTS AND DISCUSSION

Demographic Profiles of the Respondents

In this need analysis study, the sample comprised sixty-eight VAE teachers, with their demographic profiles presented in Table 2 below. The demographic analysis, spanning from Q1 to Q5, illuminates key characteristics of the respondent pool. Notably, a significant majority of respondents are female, comprising 88.2% of the sample, reflecting the predominant gender distribution in the teaching profession. Moreover, the data underscores a prevalent trend towards a mature age demographic, with 69.1% of respondents falling within the 41-50 age bracket. Regarding teaching experience in VAE subject, the data indicates a substantial proportion of respondents, accounting for 60.3%, possess 11-20 years of teaching experience. Furthermore, a notable 19.1% have been teaching for over 20 years, showing that among the respondents have a wealth of experience, offering valuable perspectives on the evolution of teaching methodologies and the challenges encountered over time. The analysis of academic backgrounds among the VAE teachers reveals a diverse range of expertise within the field. Among the respondents, the majority have backgrounds in Design Studies (Textile, Fine Metal, Industrial, Ceramic, Fashion), comprising 36.8% of the sample. This indicates a significant presence of teachers with specialized knowledge in various design disciplines. Additionally, Digital & Imaging Arts (Graphic, Printing, Photography) make up 23.5% of the respondents, highlighting the prevalence of digital media skills among VAE teachers. Moreover, 11.8% of the respondents possess backgrounds in Fine Art, indicating proficiency in artistic skills. It is noteworthy that 17.6% of VAE teachers in the sample originate from academic backgrounds unrelated to the arts. This cohort of non-optionist teachers may require additional guidance and support in VAE instruction, particularly for students preparing for the SPM examination. The distribution of academic backgrounds underscores the interdisciplinary nature of VAE, incorporating elements from fine art, digital media, design, and architecture. This diversity highlights the need for a flexible and comprehensive teaching model that can cater to the varied expertise and skills among VAE teachers. A new teaching model in VAE should integrate aspects of both conventional art practices and contemporary digital tools to provide a well-rounded education that meets the demands of technological advancements.

Table 2 *Section A-Demographic profiles of the respondents*

	Characteristic		Frequency (n)	Percentage (%)
Q1	Gender	Female	60	88.2
		Male	8	11.8
Q2	Age	20 - 30	1	1.5
		31 - 40	15	22.1
		41 - 50	47	69.1
		51 - 60	5	7.4
Q3	Experience in teaching VAE	1 – 5	5	4.7
		6 – 10	9	13.2
		11 – 20	41	60.3
		21 and above	13	19.1
Q4	Academic background	Fine Art	8	11.8
		Digital & Imaging Arts	16	23.5
		Design Studies	25	36.8
		Built Environment	7	10.3
		Others	12	17.6

The demographic data also provides information regarding the technology devices possessed by VAE teachers or those available within the school facilities, shown in Table 3 below. Smartphones emerged as the predominant device among respondents, with 97.1% indicating ownership, followed closely by laptops, reported by 95.6% of participants. These findings underscore the widespread accessibility and utilization of portable digital devices among VAE teachers, suggesting a conducive environment for the integration of AI technology into teaching methodologies. Additionally, while desktop usage was relatively lower at 25%, it still represents a substantial portion of the respondent pool. This indicates the presence of a segment of teachers who may prefer to have a permanent station for computing platforms, highlighting the importance of ensuring compatibility and adaptability of AI-integrated teaching tools across diverse technological infrastructures. Tablets were also commonly utilized, with 38.2% of respondents reporting ownership, further indicating a preference for portable and versatile computing devices among VAE teachers. However, it is noteworthy that netbooks did not register any respondents, suggesting a diminishing relevance to the scope of education context. Overall, the high prevalence of smartphones, laptops, and tablets among VAE teachers suggests a solid foundation for the implementation of AI technology-driven teaching models. By leveraging these prevalent digital platforms, teachers can effectively integrate AI tools to enhance students' creativity and streamline the illustration ideation process, aligning with the evolving needs and preferences of modern educational practices. The findings suggest that governmental support may be beneficial in allocating dedicated classrooms equipped with laptops for students' use, particularly to facilitate the ideation process and enable internet-based research. Such initiatives could potentially enhance the educational experience and align with the technological trends observed in the data.

Table 3 *Section A-Technology devices possessed by VAE teachers or those available within the school facilities*

Q5	Technology devices	Frequency (n)	Percentage (%)
	Smart phone	66	97.1
	Basic phone	7	10.3
	Laptop	65	95.6
	Desktop	17	25
	Tablet	26	38.2
	Netbook	0	0

Creativity Level among VAE Paper 3 Candidates

The first objective of this study reveals critical insights into the current state of creativity among VAE students, particularly in the context of Paper 3 examination. The findings (Table 4) shows a concerning picture of students' creative capabilities and confidence levels during the ideation process. A substantial majority of teachers (88.2%) reported that students struggle to develop ideas during the ideation process, often requiring considerable time. This difficulty in idea generation suggests a fundamental challenge in students' creative thinking abilities. The prolonged ideation process not only impacts the efficiency of classroom activities but may also hinder students' overall artistic development and performance in examinations. Adding to the severity of this problem is the heavy reliance on teacher-provided examples, as noted by 88.3% of the VAE teachers. This dependence indicates a lack of confidence in generating original ideas and a potential over-reliance on external sources for inspiration. Such behavior could limit students' ability to develop unique artistic perspectives and may result in an uniformity of creative output. The study also highlights the feelings during the creative process on students. A significant 72.1% of teachers observed that students experience stress and feel burdened by the tasks involved in the ideation process. This emotional strain could potentially lead to creative blocks, diminished enthusiasm for the subject, and overall reduced performance in VAE, and may potentially resulted dropouts addressed as ‘T’ students. Moreover, the tendency for struggling students to refer to their peers' work, as reported by 80.96% of teachers, further underscores a lack of creative confidence and independence. While peer learning can be beneficial, excessive reliance on others' ideas may hinder the development of individual artistic voices and unique creative perspectives.

Table 4 *Section B: Teachers' perceptions of their students' creativity during the illustration ideation process*

No	Statements	Frequency & Percentage				
		SD	D	N	A	SA
Q6	Understand the term of 'ideation process.'	1 1.5%	32 47.1%	7 10.3%	27 39.7%	1 1.5%
Q7	Creative in ideation	0 0%	32 47.1%	13 19.1%	21 30.9%	2 2.9%
Q8	Able to develop their ideas easily.	0 0%	3 4.4%	5 7.4%	44 64.7%	16 23.5%
Q9	Follow the examples given	1 1.5%	4 5.9%	3 4.4%	39 57.4%	21 30.9%
Q10	Having difficulties	1 1.5%	6 8.8%	12 17.6%	38 55.9%	11 16.2%
Q11	Refer to friends	0 0%	5 7.4%	8 11.8%	39 57.4%	16 23.5%

In summary, the findings of the analysis report underscore the urgency and relevance of developing a new teaching model that integrates AI technology to address the identified challenges in students' creativity during the illustration ideation process. The proposed ‘Ideation-Intelligence’ has the potential to revolutionize art education by offering personalized support, fostering creativity, and nurturing students' confidence and autonomy in the creative process. These findings collectively indicate a pressing need for interventions to boost students' creative confidence, enhance their ability to generate original ideas, and reduce the stress associated with the ideation process. The challenges identified provide a strong rationale for conducting this study and developing new approaches to foster creativity in KRSV.

Current Teaching Methods Employed by VAE Teachers

The second objective of the study provides valuable insights into the diverse range of teaching methods currently employed by VAE teachers during the ideation process as shown in Table 5 below. This analysis reveals both the strengths of current practices and areas where improvement is needed. The

study found that 47.1% of teachers allow students to explore the ideation process independently. While this approach can foster self-directed learning and creativity, the relatively low percentage suggests that many teachers may not feel confident in students' ability to navigate the ideation process without significant guidance. This finding aligns with the challenges in student creativity identified in the first objective and highlights the need for teaching methods that better support independent creative thinking. Demonstration sketching emerges as the most widely used teaching method, employed by 97.1% of teachers. While this traditional approach can be effective in teaching techniques, its commonly use raises questions about whether it might be overused at the expense of other methods that could foster more independent creativity. The integration of technology is evident, with 94.1% of teachers utilizing video presentations from platforms such as YouTube or TikTok to aid idea development. This high adoption rate of digital resources indicates a willingness among teachers to incorporate modern tools into their teaching. However, it also suggests a need for more structured and tailored technological solutions specifically designed for VAE subject. Traditional methods remain prevalent, with 88.2% of teachers using static image sheets or reference books to explain the ideation process. While these resources can provide valuable examples and inspiration, their static nature may limit interactivity and personalization in the learning process. The use of outdoor teaching methods incorporating natural resources by 70.6% of teachers demonstrates an effort to connect art with real-world experiences. This approach could be beneficial in stimulating creativity and providing diverse sources of inspiration. However, the logistical challenges of outdoor teaching may limit its frequent use. Collaboration with guest artists or external university representatives, practiced by 50% of teachers, offers students exposure to diverse perspectives and real-world artistic practices. While valuable, the limited adoption of this method suggests potential barriers in implementation, such as resource constraints or scheduling difficulties.

Table 5 *Section C- Teachers' perceptions of their students' creativity during the illustration ideation process*

No	Statements	Frequency & Percentage				
		SD	D	N	A	SA
Q12	Allowing students to develop their ideas in their own creativity.	4 5.9%	26 38.2%	6 8.8%	25 36.8%	7 10.3%
Q13	Demonstrating illustration ideation process.	0 0%	0 0%	2 2.9%	32 47.1%	34 50%
Q14	Integrating technology through video presentations.	0 0%	4 5.9%	0 0%	41 60.3%	23 33.8%
Q15	Using static image sheets	0 0%	4 5.9%	4 5.9%	46 67.6%	14 20.6%
Q16	Teaching outdoor, incorporating natural resources to relate them to the ideation process.	3 4.4%	8 11.8%	9 13.2%	41 60.3%	7 10.3%
Q17	Inviting artists or external university parties to demonstrate the ideation process.	6 8.8%	16 23.5%	12 17.6%	29 42.6%	5 7.4%

Overall, this mix of traditional and modern approaches indicates a gradual shift towards more diverse and interactive teaching methods. However, the findings also reveal a significant opportunity for innovation in teaching strategies. The varied adoption rates of different methods suggest that teachers may benefit from a more unified and comprehensive approach to fostering creativity in the ideation process.

Necessity for Developing a Novel Teaching Model

The third objective of the study provides compelling evidence for the need to develop a new teaching model aimed at enhancing students' creativity in the ideation process. The findings (Table 6) reveal a strong consensus among teachers regarding the limitations of current methods and the desire for

innovative approaches. A substantial 76.9% of teachers agreed or strongly agreed that they require a specific method to enhance students' creativity skills during the ideation process. This high percentage underscores the recognition among educators that current teaching methods may not be adequately addressing the creative challenges faced by students. It suggests a readiness among teachers to adopt new, more effective approaches to fostering creativity. The time-intensive nature of ensuring good illustration ideation processing for each student, noted by 70.6% of teachers, highlights a significant challenge in the current educational approach. This finding indicates a need for more efficient methods that can provide personalized support to students without placing an unsustainable time burden on teachers. The demand for technological integration is clearly evident, with 86.8% of teachers expressing a need for an Art Room facility equipped with electronic devices and internet access. This high percentage suggests that teachers recognize the potential of technology to enhance the learning experience and support the creative process. It also indicates a gap between the current technological resources available in schools and what teachers believe is necessary for effective VAE instruction. Furthermore, 85.3% of teachers indicated a need for training workshops on using the latest technology, such as AI applications, to enhance creativity during the ideation process.

This finding reveals not only a desire for new tools but also an awareness among teachers of the potential benefits of advanced technologies in art education. It also highlights the importance of professional development in ensuring the successful implementation of any new teaching model. The fact that 44.1% of teachers found it challenging to teach students to develop their ideas during the ideation process further underscores the urgency for new approaches. This significant percentage suggests that current methods may not be providing teachers with adequate tools and strategies to effectively guide students through the creative process. These findings collectively point towards the potential benefits of integrating AI technology into a new teaching model for ideation in KRSV process. Such a model could address many of the identified issues by providing personalized guidance, stimulating creative thinking, and offering interactive tools to support the ideation process. This approach could potentially enhance students' creativity and confidence while alleviating the time and resource constraints currently faced by teachers. The strong support for technological integration, coupled with the recognized challenges in fostering student creativity, provides a clear rationale for the development of an AI-integrated teaching model. This need is further emphasized by the teachers' expressed desire for specific methods to enhance creativity and their readiness to engage with new technologies in their teaching practice.

Table 6 *Section D - A need to develop a new teaching method model*

No	Statements	Frequency & Percentage				
		SD	D	N	A	SA
Q18	Require a specific method to teach students in ideation process.	1 1.5%	3 4.4%	9 13.2%	32 47.1%	23 33.8%
Q19	Require a long time to ensure that each student can produce good ideation process	1 1.5%	11 16.2%	8 11.8%	28 47.1%	15 23.5%
Q20	Require Art Room facility equipped with technology devices.	2 2.9%	4 5.9%	3 4.4%	14 20.6%	45 66.2%
Q21	Require training workshops on latest technology such as Artificial Intelligence applications to enhance students' creativity during the ideation process.	2 2.9%	0 0%	8 11.8%	26 38.2%	32 47.1%
Q22	Found difficulties in teaching ideation process.	3 4.4%	29 42.6%	6 8.8%	23 33.8%	7 10.3%

In conclusion, the findings from all three objectives of this study converge to highlight the pressing need for innovation in VAE subject specifically in ideation process. The challenges in student creativity, the limitations of current teaching methods, and the strong support for new technological approaches all underscore the importance of developing ‘Ideation Intelligence’ teaching model. Such a

model has the potential to address the identified issues comprehensively, potentially revolutionizing the way ideation is taught and practiced in KRSV design process.

CONCLUSION

In conclusion, this study offers critical insights into the imperative for developing an innovative teaching model, named 'Ideation-Intelligence', which integrates AI technology to enhance students' creative capacities within the ideation process of VAE coursework (KRSV). Through a comprehensive needs analysis involving sixty-eight VAE teachers, the research addressed three primary objectives, yielding significant findings. Firstly, the study clarified substantial challenges faced by students in the ideation process, with a notable proportion requiring extended periods to complete assigned tasks. Secondly, the research identified a predominance of conventional teaching methodologies among the teachers, indicating a clear gap in current instructional approaches. Lastly, the investigation revealed a pronounced demand among VAE teachers for the development of a novel teaching model that incorporates AI technology, aimed at addressing the observed deficiencies in students' creative output and existing teaching methods. This initiative concurrently addresses the persistent and concerning issue of the high percentage of 'T' students annually, which impacts students' eligibility to sit for the SPM examination. The 'Ideation-Intelligence' teaching model has the potential to be proposed to the curriculum division of the Ministry of Education as a reference for VAE teachers who serve as school assessors for KRSV. This model will include teaching guidelines and suggestions for a work progress monitoring system by leveraging AI technology to enhance students' creative processes. This need analysis study, which examines the needs of teachers and students, forms the essential starting point for creating the new 'Ideation-Intelligence' teaching model. The findings underscore the necessity for innovative educational strategies that align with technological advancements, and address the evolving needs of both teachers and students in the contemporary educational landscape.

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