International Journal of Modern Education
IJMOE
EISSN: 2637-0905
Volume 7 Issue 25 (June 2025) PP. 01-15
DOI: 10.35631/IJMOE.725001

INTERNATIONAL JOURNAL OF MODERN EDUCATION (IJMOE)
www.ijmoe.com

GLOBAL ACADEMIC EXCELLENCE

ARTSCREASTEAM LAB: A STEAM LEARNING MODULE IN VISUAL ARTS EDUCATION FOR FORM 1

Bileron Buruntong[1*], Salbiah Kindoyop[2], Musnin Misdih[3], Harozila Ramli[4], Tajul Shuhaizam Said[5], Nor Aznoni Mohamed[6], Natilie Kuintin[7]

[1] Akademi Seni dan Teknologi Kreatif, Universiti Malaysia Sabah, Malaysia
Email: bileronburuntong@gmail.com
[2] Akademi Seni dan Teknologi Kreatif, Universiti Malaysia Sabah, Malaysia
Email: salbiah.bea@ums.edu.my
[3] Akademi Seni dan Teknologi Kreatif, Universiti Malaysia Sabah, Malaysia
Email: musninmisdih67@ums.edu.my
[4] Fakulti Seni, Kelestarian dan Industri Kreatif, Universiti Pendidikan Sultan Idris, Malaysia
Email: harozila@fskik.upsi.edu.my
[5] Fakulti Seni, Kelestarian dan Industri Kreatif, Universiti Pendidikan Sultan Idris, Malaysia
Email: tajul@fskik.upsi.edu.my
[6] Sekolah Menengah Kebangsaan Bukit Mewah Negeri Sembilan Malaysia
Email: g-28513053@moe-dl.edu.my
[7] Sekolah Menengah Kebangsaan Kota Marudu Sabah Malaysia
Email: g-53237910@moe-dl.edu.my
[*] Corresponding Author

Article Info:

Article history:
Received date: 31.03.2025
Revised date: 17.04.2025
Accepted date: 15.05.2025
Published date: 05.06.2025

To cite this document:

Buruntong, B., Kindoyop, S., Misdih, M., Ramli, H., Said, T. S., Mohamed, N. A., & Kuintin, N. (2025). Artscreasteam Lab: A Steam Learning Module In Visual Arts Education For Form 1. *International Journal of Modern Education, 7* (25), 01-15.

Abstract:

The integration of visual arts in secondary education plays a crucial role in nurturing creativity and enhancing cognitive development among students. This article explores how visual arts education contributes to the development of creativity in Form 1 students through various techniques and project-based learning. Drawing from practical examples of student artworks, the article highlights the significance of providing a supportive learning environment and interdisciplinary approaches that encourage creative thinking. The findings suggest that visual arts education can effectively cultivate essential skills such as critical thinking, communication, collaboration, and innovation, preparing students for future academic and career success.

Keywords:

Art Education, Creativity, Project-Based Learning (PBL), Form 1 Students

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Introduction

The integration of visual arts in education has long been recognized for its role in nurturing creativity and critical thinking among students. However, with the rapid development of science, technology, engineering, and mathematics (STEM), there is a growing need to combine these disciplines with the arts, giving rise to the STEAM approach. This interdisciplinary method not only enhances artistic expression but also promotes higher-order thinking skills (HOTS), essential for the demands of the 21st century (Morari, 2023; Othman, H., & Mohammad, R., 2022).

In Malaysian secondary schools, particularly for Form 1 students, visual arts education often remains isolated from scientific and technological elements. Traditional pedagogies tend to emphasize rote learning, which limits students' opportunities to explore creative problem-solving through interdisciplinary projects (Kementerian Pendidikan Malaysia, 2015). Therefore, integrating visual arts with STEAM elements is crucial to providing a more holistic educational experience that prepares students for future academic and career challenges (Weng et al., 2022).

The scope of this study focuses on examining how visual arts, when integrated with STEAM components, can develop creativity, collaboration, critical thinking, and communication among Form 1 students. By using a project-based learning (PBL) approach within the ARTSCreaSTEAM LAB module, this research investigates students' engagement in hands-on projects that blend artistic techniques with digital tools and scientific principles. The objective of this study is to explore the effectiveness of the ARTSCreaSTEAM LAB module in enhancing students' creative skills and interdisciplinary understanding through visual arts education.

Moreover, the adoption of project-based learning (PBL) in visual arts classrooms allows students to immerse themselves in real-world problems where they can apply both creative and analytical skills. PBL encourages learners to take ownership of their education by engaging in meaningful projects that require critical inquiry, collaboration, and innovation. When integrated with STEAM, visual arts become a dynamic platform for students to explore scientific concepts through artistic expression, thereby deepening their understanding and retention of interdisciplinary knowledge (Zhang, C., & Jia, B., 2024). This approach shifts the focus from teacher-centered instruction to student-driven discovery, aligning with contemporary educational reforms aimed at developing independent and versatile learners.

Furthermore, as the demands of the global workforce evolve, there is an increasing emphasis on nurturing multi-skilled individuals who can think creatively while leveraging technological tools. Visual arts education, traditionally seen as a purely aesthetic pursuit, now plays a pivotal role in equipping students with such competencies. By integrating STEAM principles, students are not only learning to create art but also to understand the technological processes behind their creations, such as digital design, augmented reality, and 3D modelling. This holistic

International Journal of Modern Education
IJMOE
EISSN: 2637-0905
Volume 7 Issue 25 (June 2025) PP. 01-15
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learning environment fosters adaptability, resilience, and a deeper appreciation for both the arts and sciences, preparing students for diverse and innovative career pathways in the future (Fattal, L. 2020).

Specifically, it aims to:

a). Evaluate the impact of STEAM-based art projects on students' creativity and problem-solving abilities.

b). Assess student engagement and motivation when exposed to a blended learning environment combining art and technology.

c). Identify the challenges and benefits of implementing STEAM elements in a visual arts curriculum.

This study contributes to the growing body of research advocating for interdisciplinary education by demonstrating how visual arts can be a powerful medium for integrating STEM concepts, ultimately fostering well-rounded, innovative learners (Baruah, J., Burch, G., & Burch, J., 2022; Buruntong & Kindoyop, 2024).

Problem Statement

Despite the acknowledged benefits of visual arts education in fostering creativity, critical thinking, and personal expression, many schools still rely heavily on traditional monodisciplinary teaching methods that fail to integrate artistic learning with other essential fields such as science and technology. This compartmentalized approach not only limits students' exposure to interdisciplinary thinking but also stifles their ability to apply creative skills in broader, real-world contexts (Iberahim Hassan, 2000; Roslina Mohd Nor et al., 2019).

In the current education system, particularly within Malaysian secondary schools, visual arts is often treated as a standalone subject, isolated from the mainstream academic focus of STEM disciplines. Ramli et al. (2022) state that, consequently, students lack the opportunity to explore how artistic processes can complement scientific and technological understanding, leading to an underdevelopment of higher-order thinking skills (HOTS) such as problem-solving, innovation, and analytical reasoning. This separation hinders the holistic development of students, especially in an era where 21st-century competencies demand flexibility, creativity, and cross-disciplinary knowledge (Kementerian Pendidikan Malaysia, 2013).

Moreover, the absence of well-structured and engaging programs that integrate STEAM (Science, Technology, Engineering, Arts, and Mathematics) into visual arts education exacerbates this issue. Teachers often lack resources, training, and curricular support to implement such interdisciplinary approaches effectively. As a result, students are deprived of the chance to engage in meaningful learning experiences that not only enhance their artistic abilities but also equip them with skills relevant to the evolving global workforce (Sanz-Camarero, Ortiz-Revilla, & Greca, 2023).

Therefore, it is imperative to rethink and redesign visual arts education through innovative pedagogical methods, such as project-based learning (PBL) and the integration of digital tools, to foster creativity and interdisciplinary comprehension. This shift will not only enrich the

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educational experience but also align visual arts education with the broader goals of national and global education frameworks aimed at developing well-rounded, future-ready individuals (Yefimenko, Yakymchuk, Kravtsova, Sotska, & Korol, 2020).

Literature Review

Visual arts education has long been regarded as an essential component in fostering creativity among students. According to Amabile (1997), creativity in education can be stimulated through environments that support freedom of thought and exploration of new ideas. Visual arts provide a unique platform for such exploration, enabling students to express their ideas visually while developing cognitive flexibility. This subject goes beyond aesthetics, offering a structured way to enhance problem-solving, emotional intelligence, and innovation. In the context of 21st-century learning, the integration of arts with STEM disciplines (science, technology, engineering, and mathematics) forms the basis of the STEAM approach, which emphasizes interdisciplinary learning to produce more creative and innovative students (Weng et al., 2022). The STEAM framework aligns with modern educational policies that aim to cultivate versatile learners capable of adapting to complex, technology-driven environments.

Previous studies have shown that the STEAM approach can significantly enhance higher-order thinking skills among secondary school students. For instance, Othman et al. (2022) found that students involved in project-based activities that combine art and technology demonstrated improvements in critical thinking and problem-solving abilities. These skills are essential not only in academic settings but also in real-life situations where students are expected to analyze, evaluate, and create solutions independently. Furthermore, the use of technology such as augmented reality (AR), digital design software, and 3D printing in visual arts has been proven to increase students' interest, motivation, and engagement with learning materials (Suraya, B. 2021). The application of these tools bridges the gap between traditional art practices and modern technological advancements, allowing students to experience a more dynamic and interactive learning process.

In a study by Roslina Mohd Nor et al. (2019), visual arts teachers who adopted interdisciplinary approaches reported better student achievements and a deeper understanding of the connections between art and science. Teachers noted that students who participated in integrated learning projects could better relate scientific principles to their artistic creations, such as using geometry in design or understanding light and color theory through physics. This indicates that integrating STEAM into art education not only enriches learning experiences but also provides a strong foundation for academic growth, particularly in subjects that require critical and creative thinking. Moreover, such interdisciplinary learning promotes collaboration among students, fostering teamwork and communication skills that are vital for success in diverse fields. Table 1 shows the summary of previous research on creativity and interdisciplinary learning in art education, further supporting the relevance of STEAM in contemporary classrooms.

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Table 1: Overview of Previous Research on Creativity and Interdisciplinary Learning in Art Education

Researcher(s)	Year	Focus of Study	Key Findings
Amabile, T.	1997	Creativity theory in organizational settings	Creativity influenced by intrinsic motivation & environment.
Weng, X. et al.	2022	STEAM & digital design integration	STEAM enhances creativity & critical thinking among students.
Othman, H., & Mohammad, R.	2022	Creative STEM teaching module	Students more engaged & motivated in STEM learning.
Roslina Mohd Nor et al.	2019	Visual arts teachers' pedagogical knowledge	Interdisciplinary teaching improves student achievement.
Suraya, B.	2021	STEM-based visual arts module for primary schools	Technology enriches visual arts learning experience.

Methodology

This study employs a qualitative research approach involving classroom observations, student assessments, and semi-structured interviews. Data were collected to evaluate student engagement, creativity, and the overall effectiveness of visual arts education in developing essential skills. Thematic analysis was conducted to identify patterns related to creativity, collaboration, communication, and cognitive development. Additionally, the assessment rubric for Visual Arts Education (VAE) was used to systematically evaluate the quality and conceptual depth of student artworks (Buhari, S., & Sihes, A. 2024).

Theoretical Framework

This study is grounded in Amabile's Componential Theory of Creativity (1997), which emphasizes the importance of intrinsic motivation, domain-relevant skills (visual arts), and general creativity skills in producing creative outcomes. Additionally, Constructivist Learning Theory forms part of the framework, where students build knowledge actively through hands-on, collaborative experiences (Vygotsky, 1978).

Conceptual Framework

The integration of visual arts with interdisciplinary learning is essential for developing creativity in students. Visual arts education, when paired with hands-on, project-based learning (PBL), provides students with opportunities to explore artistic expression while simultaneously developing cognitive and technical skills. The conceptual framework of this study emphasizes three key components: exploration, experimentation, and innovation.

a). Exploration: Students investigate visual art concepts through research, discussions, and practical activities, fostering curiosity and critical thinking.

b). Experimentation: Students apply learned techniques in real-world projects, enhancing creativity, adaptability, and problem-solving skills.

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c). Innovation: Students refine their work based on feedback, building confidence in artistic expression and communication.

Figure 1 below shows modified conceptual framework for ARTSCreaSTEAM LAB (Adapted from Amabile, 1997).

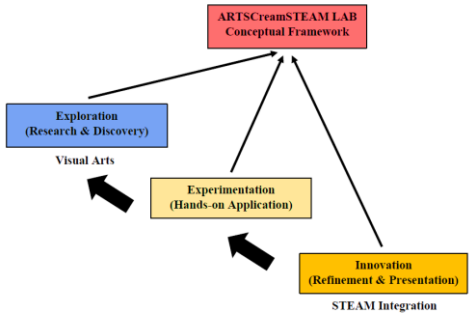

Figure 1: Modified Conceptual Framework for ARTSCreaSTEAM LAB (Adapted from Amabile, 1997)

In the exploration phase, students investigate concepts related to visual arts and STEAM through research, discussions, and hands-on experimentation. This phase encourages curiosity and critical thinking, helping students identify connections between artistic expression and scientific principles. The experimentation phase involves applying knowledge and techniques in real-world artistic projects. Students engage in activities such as landscape painting with digital enhancements, architectural design, and flora & fauna printmaking, allowing them to experiment with different artistic media, technological tools, and problem-solving strategies. This process nurtures creativity, adaptability, and innovation, aligning with 21st-century learning goals (Morari, M., 2023).

Finally, the innovation phase focuses on refining and presenting their creative projects. Students receive feedback, reflect on their learning process, and improve their work based on constructive critiques. This phase enhances their communication skills, collaboration abilities, and self-confidence in expressing ideas through art and technology. Overall, the ARTSCreaSTEAM LAB conceptual framework integrates PBL principles to create a dynamic, student-centred learning environment, preparing students with the skills necessary for success in both artistic and technological fields (Baruah, J., Burch, G., & Burch, J. (2022).

Time and Location of Study

The study was conducted over a period of three months, from March to May 2024, at Sekolah Menengah Kebangsaan Kota Marudu, located in Sabah, Malaysia. This school was chosen due to its active engagement in both visual arts and STEM-related extracurricular activities, making it an ideal setting for the implementation of the ARTSCreaSTEAM LAB module.

Participants and Sample

The study involved students from Sekolah Menengah Kebangsaan Kota Marudu Sabah.

Sample Selection

A total of 42 students participated, selected based on their interest in visual arts and STEAM.

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Research Instruments

Data collection involved classroom observations, student assessments, and student interviews, utilising structured observation forms, the KSSM Visual Arts Education assessment rubric, and an interview checklist to ensure comprehensive and systematic data gathering.

Data Collection Procedure

Students engaged in various hands-on activities integrating STEAM elements in visual arts education, including:

a). *Landscape Painting with Digital Enhancements*

This activity allows students to explore traditional landscape painting techniques while incorporating digital enhancements. They create paintings using conventional media such as watercolours or acrylics and then enhance their work using digital tools, such as augmented reality (AR) applications or graphic design software. This approach fosters creativity and helps students understand how technology can be applied in visual arts.

b). *Architectural Design Projects*

In this activity, students apply principles of art and engineering to create architectural models. They use materials such as cardboard, lightweight wood, or 3D printing to design and construct small-scale building structures. This process enhances their understanding of balance, proportion, and spatial design while integrating elements of mathematics and engineering.

c). *Flora & Fauna Print making*

This activity combines biological studies with artistic expression through printmaking. Students create illustrations inspired by local flora and fauna using printmaking techniques such as linocut or block printing. This approach encourages students to appreciate biodiversity while learning traditional and contemporary printing methods.

Flow Chart of Research Process

The flow chart above illustrates the systematic research process undertaken in the ARTSCreaSTEAM LAB study. The research began with the planning and design phase, during which the researchers developed the learning module and outlined strategies for data collection. This was followed by participant selection, where students with an interest in visual arts and STEAM were purposively selected to participate in the study. Once participants were chosen, the implementation of the ARTSCreaSTEAM LAB Module commenced. This phase included project-based learning activities that integrated elements of art and technology. During the module, data were gathered through data collection methods, including classroom observations, student assessments, and semi-structured interviews.

The next stage, data management, involved organizing observational notes, transcribing interviews, and compiling student artworks for further analysis. Subsequently, data analysis was conducted, focusing on the evaluation of student artworks and identifying recurring patterns using thematic analysis. The analysis, the researchers proceeded with the interpretation of findings, where insights gained from the data were linked back to the research objectives. Finally, the process concluded with report writing and conclusion, documenting the results and implications of the study in a comprehensive manner (Yanto, E., 2023). Figure 2 illustrates a

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flow chart that provides a clear visualization of the logical sequence of the research, demonstrating a well-structured and methodical approach from initial planning to final reporting.

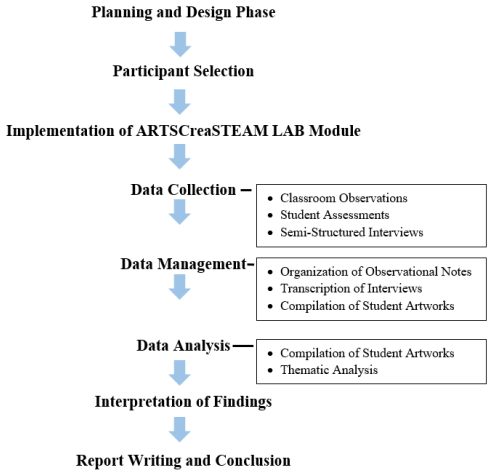

Figure 2: Flow Chart of Research Process

Data Analysis

Data were analysed using thematic analysis to identify patterns in students' learning experiences and engagement with the ARTSCreaSTEAM LAB module. Additionally, the KSSM Visual Arts Education assessment rubric was used to systematically evaluate the artistic quality and conceptual depth of students' visual artworks, ensuring a structured assessment of their creative and technical skills. Thematic coding was applied to categorise emerging themes from classroom observations and student interviews, focusing on creativity, critical thinking, and interdisciplinary understanding. Additionally, student assessments were evaluated to examine the depth of their conceptual grasp and artistic development throughout the module (Avotiņa, A., & Froloviceva, V., 2023).

Challenges of Data Management

Throughout the course of this study, several challenges in managing data were identified. Firstly, the diversity among participants posed a notable issue, particularly in relation to students' prior exposure to technology. Some students were already familiar with digital tools used in the project, while others required more time and guidance, which led to varying levels of engagement and productivity during the activities. This disparity necessitated differentiated instruction and additional support to ensure equitable participation. Additionally, the limited sample size of 42 students presented a challenge in terms of generalizability. While the data gathered offered rich insights into the effectiveness of the ARTSCreaSTEAM LAB module, the small cohort meant that findings could not be broadly applied without caution. The sample's specific context and characteristics might differ significantly from those of other schools or regions, which may limit the wider applicability of the results.

Scheduling conflicts also impacted the research process. Coordinating data collection activities, such as observations and interviews, with the school's academic timetable required flexibility. Certain sessions had to be rescheduled due to examinations, school events, or unforeseen absences, which occasionally delayed the research timeline and necessitated adjustments to planned activities. Furthermore, the complexity of qualitative data presented its

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own set of difficulties. Thematic analysis required the coding of large volumes of observational notes, interview transcripts, and student work, which was both time-consuming and required meticulous attention to detail. Ensuring accuracy and consistency during this phase was crucial to maintain the validity of the findings.

Lastly, maintaining consistency and objectivity in observations was another challenge. Given the subjective nature of classroom interactions and creative processes, it was essential to use structured observation tools and standardized assessment rubrics to minimize bias. The researcher had to remain vigilant in applying these tools uniformly across all participants to ensure that the data collected was reliable and comparable.

ARTSCreaSTEAM LAB: A STEAM Learning Module in Visual Arts Education

ARTSCreaSTEAM LAB is a specialised learning module designed to integrate visual arts with STEM elements, transforming traditional art education into an interdisciplinary and technology-enhanced learning experience. This module emphasises hands-on, project-based learning, allowing students to explore various creative and technological applications in art. By incorporating digital tools, scientific principles, and engineering concepts into artistic practices, ARTSCreaSTEAM LAB encourages students to develop problem-solving skills, critical thinking, and artistic expression in a more engaging and meaningful manner. Through activities such as digital-enhanced landscape painting, architectural design projects, and flora & fauna printmaking, students are exposed to the interconnectedness of art and science, fostering innovation and a deeper appreciation of both disciplines (Weng, X., Ng, O., Cui, Z., & Leung, S., 2022).

Findings and Discussion

This study reveals that the ARTSCreaSTEAM LAB module successfully integrates visual arts with STEM elements through hands-on projects, enabling students to explore creative and technological applications in art. The findings demonstrate that students not only develop their artistic abilities but also enhance their problem-solving and interdisciplinary thinking skills. Through structured activities, they gain exposure to digital tools, scientific concepts, and engineering principles, which enrich their learning experience. Table 1 below shows the summary of student outcomes based on ARTSCreaSTEAM LAB implementation.

Table 1: Summary of Student Outcomes Based on ARTSCreaSTEAM LAB Implementation

Findings	Discussion
Improved 21st-Century Skills	84% of students showed improvements in critical thinking, creativity, collaboration, and communication through hands-on projects. The module fosters interdisciplinary connections between art and STEM, enabling students to develop innovative artistic approaches.
Increased Student Engagement and Motivation	Students exhibited higher levels of enthusiasm when integrating digital tools, scientific concepts, and artistic techniques. The interactive nature of the module enhances their learning experience, making it more engaging and meaningful.
Academic Performance Growth	Assessment results show that 77% of students achieved Grade A, 19% attained Grade B, and 4% received Grade C. These findings indicate that most students successfully applied STEAM concepts in

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EISSN: 2637-0905
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their artistic creations, demonstrating a strong grasp of interdisciplinary learning.

Improved 21st-Century Skills

The study found that 84% of students showed improvements in 21st-century skills, particularly in critical thinking, creativity, collaboration, and communication, after engaging with the ARTSCreaSTEAM LAB module. This module has helped students develop critical thinking skills by analysing and solving problems creatively in the production of artworks that integrate STEAM elements. For example, students must understand scientific and technological principles and apply them in their artistic processes, such as using digital design software to enhance landscape paintings or applying engineering concepts in architectural design projects. In terms of creativity, the module encourages students to explore innovative approaches to artistic expression, including printmaking techniques inspired by flora and fauna based on biodiversity studies. The integration of technology allows students to expand beyond traditional art forms, incorporating augmented reality (AR) and 3D printing into their creative work (Almazroa, H., & Alotaibi, W., 2023).

Furthermore, collaboration among students was significantly strengthened through STEAM-based projects that required teamwork. In the architectural design project, for instance, students worked together to plan, divide tasks, and contribute ideas to create building models that were not only aesthetically pleasing but also structurally sound based on mathematical and scientific principles. Communication skills were also enhanced, as students were provided opportunities to present their work, explain their creative process, and engage in constructive feedback sessions. These presentations and reflective discussions helped students articulate their thoughts more clearly and systematically (Van Laar, Van Deursen, Van Dijk, & De Haan, 2020). Figure 2 illustrates students actively engaging in hands-on STEAM-based projects, showcasing collaborative learning and the integration of technology in artistic creation.

Figure 2: Enhancing 21st-Century Skills Through Interdisciplinary Learning

Overall, ARTSCreaSTEAM LAB not only enhances students' artistic abilities but also equips them with essential skills for the 21st century. By integrating visual arts with STEM elements through project-based learning (PBL), the module fosters critical thinking, innovation, teamwork, and effective communication. These findings demonstrate that interdisciplinary learning approaches can have a positive impact on students' overall skill development, preparing them for the challenges of the modern educational and professional landscape.

Increased Student Engagement and Motivation

The findings of this study indicate that the hands-on nature of the module significantly enhanced student engagement and motivation. A majority of students reported that learning

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EISSN: 2637-0905
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through interactive and practical activities made the learning process more enjoyable and meaningful compared to traditional lecture-based methods. By incorporating experiential learning strategies, the module allowed students to actively participate in the creative process, leading to a deeper understanding of both artistic and scientific concepts (Kong, Y., 2021). The combination of hands-on projects and real-world applications fostered curiosity and sustained students' interest, resulting in higher levels of participation and enthusiasm in the classroom.

Furthermore, technological integration played a crucial role in increasing student motivation. The use of augmented reality (AR), 3D printing, and digital design software provided students with innovative tools to explore artistic expressions while developing relevant technical skills. These digital interventions not only enriched students' creative experiences but also increased their confidence in using emerging technologies, making the learning process more dynamic and engaging (Cents-Boonstra, Lichtwarck-Aschoff, Denessen, Aelterman, & Haerens, 2020). Many students expressed excitement when working with these tools, as they allowed them to bring their artistic ideas to life in new and unconventional ways. Figure 3 illustrates students engaging in hands-on and technology-enhanced activities.

Figure 3: Students Engaging in Hands-On and Technology-Enhanced Activities

Collaboration was another key factor that contributed to increased engagement. The study found that teamwork-based projects encouraged active participation, as students worked together to brainstorm ideas, share responsibilities, and provide constructive feedback. This collaborative environment not only enhanced social interactions but also fostered a sense of accomplishment and belonging among students. Many participants highlighted that working on creative projects as a team made learning more enjoyable and motivating, as they were able to support and inspire each other throughout the process (Erickson, M., Marks, D., & Karcher, E., 2020).

Overall, the findings suggest that the interactive, technology-enhanced, and collaborative nature of the module had a positive impact on student engagement and motivation. The combination of hands-on learning, interdisciplinary approaches, and innovative tools helped create an enjoyable and stimulating learning experience, ultimately encouraging students to be more invested in their creative and academic pursuits.

Academic Performance Growth

Findings from this study indicate that the implementation of the ARTSCreaSTEAM LAB module has had a positive impact on student's academic performance, particularly in understanding Visual Arts concepts integrated with STEAM elements. Assessments of students' artwork using the KSSM visual arts Education (PSV) assessment rubric revealed

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significant improvements in artistic skills, critical thinking, and the application of technology in art (Kementerian Pendidikan Malaysia, 2015).

Analysis of students' scores showed that 77% of students achieved a Grade A, demonstrating a high level of mastery in artistic techniques, innovation, and understanding of the connections between art and science. 19% of students obtained a Grade B, indicating a good level of comprehension, though with room for improvement in applying STEAM concepts in their artwork. 4% of students received a Grade C, suggesting a need for additional support in integrating artistic elements with technology and scientific principles. These results confirm that the module successfully enhances students' technical and aesthetic skills in art production while also enabling them to understand the scientific and technological principles related to art. Students who previously lacked confidence in creating artwork through a STEAM approach showed significant progress after being exposed to new techniques such as digital printing, architectural design, and the use of graphic design software. Figure 4 illustrates academic achievement growth through ARTSCreaSTEAM LAB.

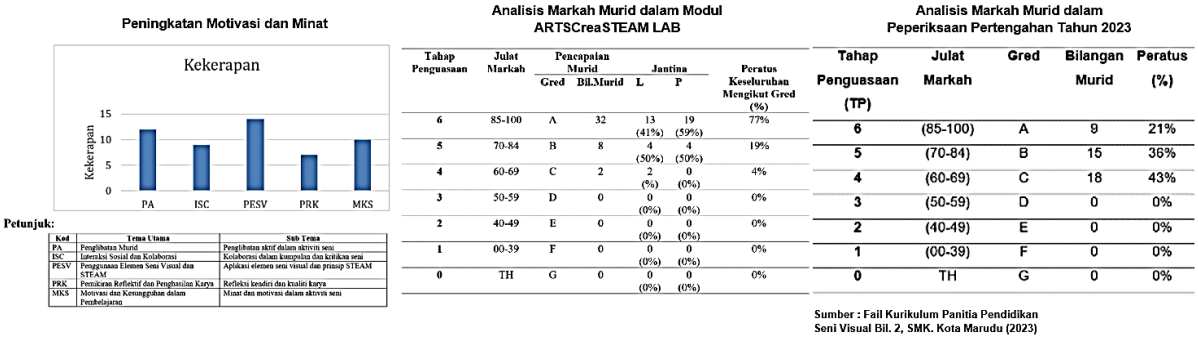

Figure 4: Academic Achievement Growth Through ARTSCreaSTEAM LAB

Furthermore, students' academic performance was strengthened through a Project-Based Learning (PBL) approach, where they were given the freedom to explore and solve problems creatively. The study found that students engaged in projects integrating art with technology were more likely to develop problem-solving and analytical thinking skills, which also benefitted their learning in other subjects, such as mathematics and science. Overall, the ARTSCreaSTEAM LAB module has proven to be effective in enhancing students' academic performance, not only in Visual Arts but also in creatively applying STEM knowledge. The integration of art with technology has added a new dimension to visual arts education, making the learning process more engaging and effective in improving students' academic achievements (Kementerian Pendidikan Malaysia, 2013).

Conclusion

The findings of this study affirm that the ARTSCreaSTEAM LAB module successfully achieved its objectives in enhancing creativity, critical thinking, collaboration, and communication among Form 1 students through an interdisciplinary visual arts approach. By integrating elements of STEAM into visual arts education, students were not only able to produce innovative artworks but also developed essential skills needed for the 21st century.

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The first objective to evaluate the impact of STEAM-based art projects on students' creativity and problem-solving abilities was met, as evidenced by significant improvements in students' ability to think critically and creatively during hands-on projects. The second objective assessing student engagement and motivation was achieved through high levels of participation and positive feedback, especially in activities involving digital tools and collaborative learning. The third objective identifying challenges and benefits of implementing STEAM elements in the curriculum was fulfilled, with insights into both the opportunities and logistical challenges of merging arts with science and technology.

This study contributes meaningfully to theoretical understanding by applying Amabile's Componential Theory of Creativity and Constructivist Learning Theory in the context of visual arts education. It demonstrates how these theories can be operationalized through project-based, interdisciplinary modules that foster creativity and knowledge construction. In terms of practical implications, the ARTSCreaSTEAM LAB module serves as a model for educators seeking to modernize art education and make it more relevant to current educational demands. It provides a framework for incorporating technology and scientific principles into artistic practices, thereby preparing students for diverse future career paths where creativity and technical skills are increasingly intertwined.

Moving forward, the findings suggest that scaling the module to different educational contexts could further validate its effectiveness. It is recommended that future studies explore its application in other schools, with larger and more diverse student populations, and investigate the long-term impact of STEAM integration in arts education. In conclusion, the ARTSCreaSTEAM LAB module has proven to be a dynamic and impactful approach, aligning visual arts with STEAM to promote holistic student development. It reinforces the value of interdisciplinary learning and highlights the importance of innovation in educational practices.

Acknowledgements
The authors would like to extend special gratitude to Universiti Malaysia Sabah, Sekolah Menengah Kebangsaan Kota Marudu and all participating students and teachers for their support and cooperation in the implementation of ARTSCreaSTEAM LAB. Special thanks to the Ministry of Education Malaysia for their encouragement of STEAM-based education research and for sponsoring this study.

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