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E-PROCEEDING

EXTENDED ABSTRACT

UiTM *di hatiku*

اوسها تقوى موليا

E-PROCEEDING

EXTENDED ABSTRACT



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Welcome Message RECTOR, UITM KEDAH BRANCH

Assalamualaikum warahmatullahi wabarakatuh,

First and foremost, I would like to extend my deepest appreciation to the organising committee of i-SPIKE 2025 for their steadfast dedication and commitment in making this prestigious event a reality. My heartfelt congratulations to the committee for their tireless efforts in ensuring that i-SPIKE continues to grow as a meaningful and impactful platform for academics, researchers, students, and industry players worldwide.

The theme for this year, “Empowering Minds: Bridging Innovation, Knowledge and Education for a Sustainable Future,” is both timely and significant. It reflects our shared responsibility to not only embrace creativity and technological advancement, but also to ensure that innovation directly contributes to sustainable development, equitable education, and the well-being of future generations.

i-SPIKE 2025 provides a dynamic platform for showcasing innovations that address real-world challenges while opening new avenues for collaboration, engagement, and inclusivity. By bridging knowledge, innovation, and education, this symposium strengthens our collective capacity to design solutions that empower communities and inspire positive change.

I am truly impressed by the diversity and calibre of participants in this year’s event. The projects and ideas presented highlight the extraordinary creativity and determination of our innovators. I am confident that the insights and solutions shared here will pave the way for continuous advancement in teaching, learning, and innovation.

It is my sincere hope that you will find i-SPIKE 2025 an enriching experience, one that sparks new ideas, builds lasting collaborations, and strengthens our shared vision for a sustainable future. To all participants, I wish you every success, and to the winners, my warmest congratulations.

Once again, I thank the organising committee, partners, and contributors for their invaluable support. May i-SPIKE 2025 continue to inspire and empower minds for many years to come.

Professor Dr. Roshima Haji Said
Acting Rector
Universiti Teknologi MARA (UiTM) Kedah Branch

Welcome Message (i-SPIKE 2025 CHAIR)

It is my great pleasure to welcome you to the 4th International Exhibition & Symposium on Productivity, Innovation, Knowledge, and Education 2025 (i-SPIKE 2025). This year's theme, "Empowering Minds: Bridging Innovation, Knowledge, and Education for a Sustainable Future," reflects our collective commitment to advancing innovation and fostering meaningful collaboration across academia, industry, and communities.

i-SPIKE 2025 provides a platform for scholars, researchers, students, and practitioners from diverse fields to showcase their ideas, share knowledge, and inspire new solutions to global challenges. We extend our sincere appreciation to all participants and contributors whose efforts and dedication have made this symposium possible.

We hope that this e-proceedings serves not only as a record of the innovations presented but also as a valuable resource that continues to inspire long after the event.

Thank you.

Dr Junaida Ismail
Chair

4th International Exhibition & Symposium on Productivity, Innovation,
Knowledge, and Education 2025 (i-SPIKE 2025)

PREFACE

The 4th International Exhibition & Symposium on Productivity, Innovation, Knowledge, and Education (i-SPIKE 2025) marks yet another milestone in our ongoing commitment to fostering innovation, creativity, and collaboration across disciplines. Guided by this year's theme, "Empowering Minds: Bridging Innovation, Knowledge and Education for a Sustainable Future," the event provides a dynamic platform for students, educators, researchers, and professionals to share their ideas, showcase their innovations, and engage in meaningful knowledge exchange.

This year, we are pleased to report that i-SPIKE 2025 received approximately 50 initial submissions, with more than 35 projects successfully advancing to final presentation and exhibition. These projects reflect a rich diversity of innovation, ranging from educational technologies, digital applications, and gamified learning tools to sustainable materials, cultural heritage preservation, and community-focused solutions. Collectively, they embody the spirit of bridging innovation and education to address pressing societal and global challenges.

We sincerely thank all participants, reviewers, and committee members for their invaluable contributions in making i-SPIKE 2025 a success. It is our hope that this e-proceedings will not only serve as a record of the ideas and innovations presented, but also as an inspiration for future collaborations and advancements in the pursuit of sustainable knowledge and innovation.

Assoc. Prof. Dr. Azlyn Ahmad Zawawi
Editor-in-Chief, i-SPIKE 2025 Proceedings

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CATEGORY 1
S&T (ACADEMIC)

VIRTUAL REALITY IN INDUSTRIAL TRAINING: SUSTAINABLE CAMPUS-BASED LEARNING INNOVATION

Nursuria Md Setamam¹

¹Universiti Teknologi MARA, 26400 Jengka, Pahang, MALAYSIA
Email: nursuriasetamam@uitm.edu.my

Fairuzdzah Ahmad Lothfy¹

¹Universiti Teknologi MARA, 26400 Jengka, Pahang, MALAYSIA
Email: fairuzdzah@uitm.edu.my

Nur Sha'adah Zainuddin¹

¹Universiti Teknologi MARA, 26400 Jengka, Pahang, MALAYSIA
Email: nsz@uitm.edu.my

Norhusni Bahari¹

¹Universiti Teknologi MARA, 26400 Jengka, Pahang, MALAYSIA
Email: husninor2@gmail.com

ABSTRACT

This project explores the use of Virtual Reality (VR) as a sustainable innovation in industrial training, aimed at enhancing campus-based learning at Universiti Teknologi MARA (UiTM) Jengka. The initiative focuses on creating immersive digital experiences that replicate professional environments, enabling students to engage with realistic training scenarios while reducing the financial and ecological costs of conventional training. Utilizing 360° photography, AI-generated narration, and the Lapentor platform, the project developed an interactive virtual tour featuring academic facilities, laboratories, and workplace-inspired settings. Through this process, students strengthened their skills in digital storytelling, multimedia integration, and project design, while deepening their understanding of industrial practices. Beyond technical competencies, the project demonstrates how digital transformation can advance sustainability by minimising physical resource use and expanding access to learning opportunities. The outcomes align with the United Nations Sustainable Development Goals (SDGs), particularly in fostering quality education, innovation, and sustainable practices. This VR-based model underscores UiTM's commitment to educational innovation, illustrating how technology can transform industrial training into an engaging, inclusive, and sustainable learning experience.

Keywords: Virtual Reality, Sustainable Education, Industrial Training, Immersive Learning, Digital Innovation

INTRODUCTION

The education landscape is being reshaped by digital technologies, particularly Virtual Reality (VR), which enables immersive learning experiences that extend beyond traditional classroom boundaries. Conventional industrial training often faces three major challenges: limited access to real-world experiences, minimal integration of digital tools, and high costs associated, with travel, materials, and logistics. These factors not only restrict participation but also contribute to environmental impact (Almeida et al., 2023; Söderlund et al., 2024). Additionally, students often lack opportunities to engage with digital tools that are increasingly prevalent in modern industries (Doolani et al., 2020). The initiative at UiTM Jengka offers an alternative approach by demonstrating how immersive VR can enhance learning while promoting sustainability. The student-led project developed a virtual campus tour that stimulates real-life tasks and environments by digitising campus facilities through 360° photography, integrating AI-generated narration, and using Lapentor for interactive design. The primary aim of the project was to design a VR-based platform for in-campus industrial training that provides immersive experiences comparable to real-world practice. Its specific objectives were to produce digital modules replicating industrial and academic tasks, to integrate narration and multimedia elements for engaging learning, and to cultivate employability skills while reducing reliance on physical training placements. This approach fosters digital competency and reduces physical resource consumption, aligning with environmentally conscious educational models (Makransky & Mayer, 2022; Zhang, 2024). Overall, the project demonstrates how VR can enhance engagement, improve accessibility, and support employability and sustainability goals in higher education.

LITERATURE REVIEW

Virtual Reality (VR) facilitates immersive digital environments where students can simulate real-world industrial tasks. This experiential approach enables learners to acquire hands-on skills relevant to the workplace while enhancing their adaptability to evolving digital landscapes (Almeida et al., 2023). Studies have shown that virtual training methods significantly improve students' task performance and engagement compared to traditional instructional approaches (Kaplan et al., 2020; Paszkiewicz et al., 2023). The immersive nature of VR promotes higher engagement and information retention by incorporating multiple sensory inputs that enhance cognitive and emotional learning processes (Makransky & Mayer, 2022). According to Makransky and Mayer, immersive learning environments lead to better long-term knowledge retention and overall outcomes (Makransky & Mayer, 2022). Moreover, VR's capacity to simulate complex industrial scenarios, such as machinery operation, allows students to gain technical proficiency without the risks associated with traditional training (Saklangiç & Mertoğlu, 2023).

Advances in VR technology also support more inclusive teaching methodologies that accommodate diverse learner needs, thereby broadening participation and improving the quality of skill acquisition aligned with labour market demands (Zhang, 2024). In sectors such as healthcare and engineering, VR-based training has demonstrated effectiveness in enhancing knowledge retention and ensuring safety during practise (Nambi et al., 2021). As educational institutions increasingly adopt VR technology, it becomes imperative to harness its potential to address existing educational limitations, thus preparing a generation for the demands of modern workplaces (Almeida et al., 2023; Paszkiewicz et al., 2023). The literature supports that incorporating VR in education can enrich learning experiences and better prepare students for future careers in increasingly digitalised industries (Parong & Mayer, 2020; Doolani et al., 2020).

METHODOLOGY

The project was conducted as a four-week industrial training programme at UiTM Jengka. The process began with the preparation of a storyboard to sequence scenes and narration. Panoramic images of campus facilities, including the main entrance, library, residential colleges, and commercial areas, were captured using the 360 degree Photo Sphere Camera application on a smartphone and subsequently transferred to the Lapentor platform. Narration was generated with Text-to-Speech (TTS) AI tools and synchronised with the visuals, while background music and videos were incorporated to enhance user engagement. Interactive hotspots were embedded to enable users to navigate between scenes, access external resources, and explore supplementary information. The virtual tour was then tested, refined, and finalised based on supervisor feedback, resulting in a functional VR-based learning tool that effectively replicates industrial and academic contexts (Figure 1).

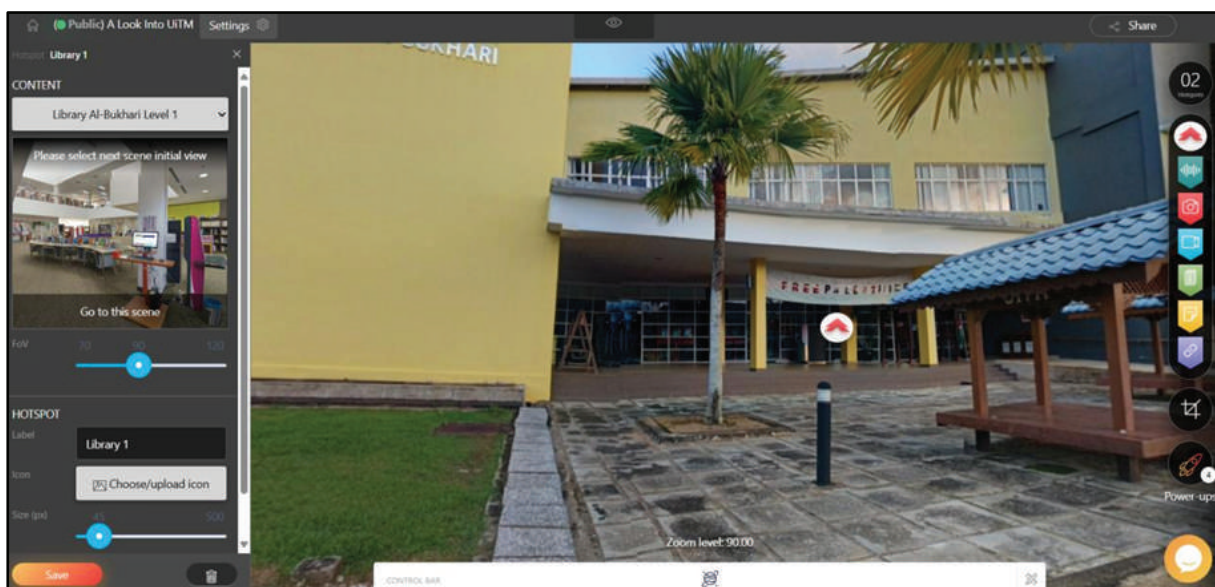


Figure 1. Sample screenshot from the Interactive 360° Virtual Campus Tour of UiTM Jengka, on the Lapentor platform

RESULT AND DISCUSSION

The final VR tour successfully demonstrated how industrial training can be replicated in a virtual environment. Through the integration of 360° photography, AI-generated narration, and interactive hotspots, users were able to explore the campus as if physically present. The student played an active role in every stage of the production process, from capturing 360° images and developing the storyboard to editing content and integrating multimedia elements using the Lapentor platform. Supervisor guidance was essential in maintaining quality and structure, particularly during content planning, revision, and final approval. This hands-on experience enabled the student to develop critical digital and creative skills while emphasizing the importance of collaboration and systematic workflow (Figure 2). As illustrated in the flowchart, the process involved interactive communication between the student and supervisor to refine each stage, including visual planning, narration editing, and technical troubleshooting. Despite certain limitations, such as equipment availability and platform constraints, the student demonstrated strong problem-solving abilities and adaptability. The final output achieved its intended purpose as both virtual tour and a multifunctional tool for promotional and education, featuring sustainable and engaging digital content.

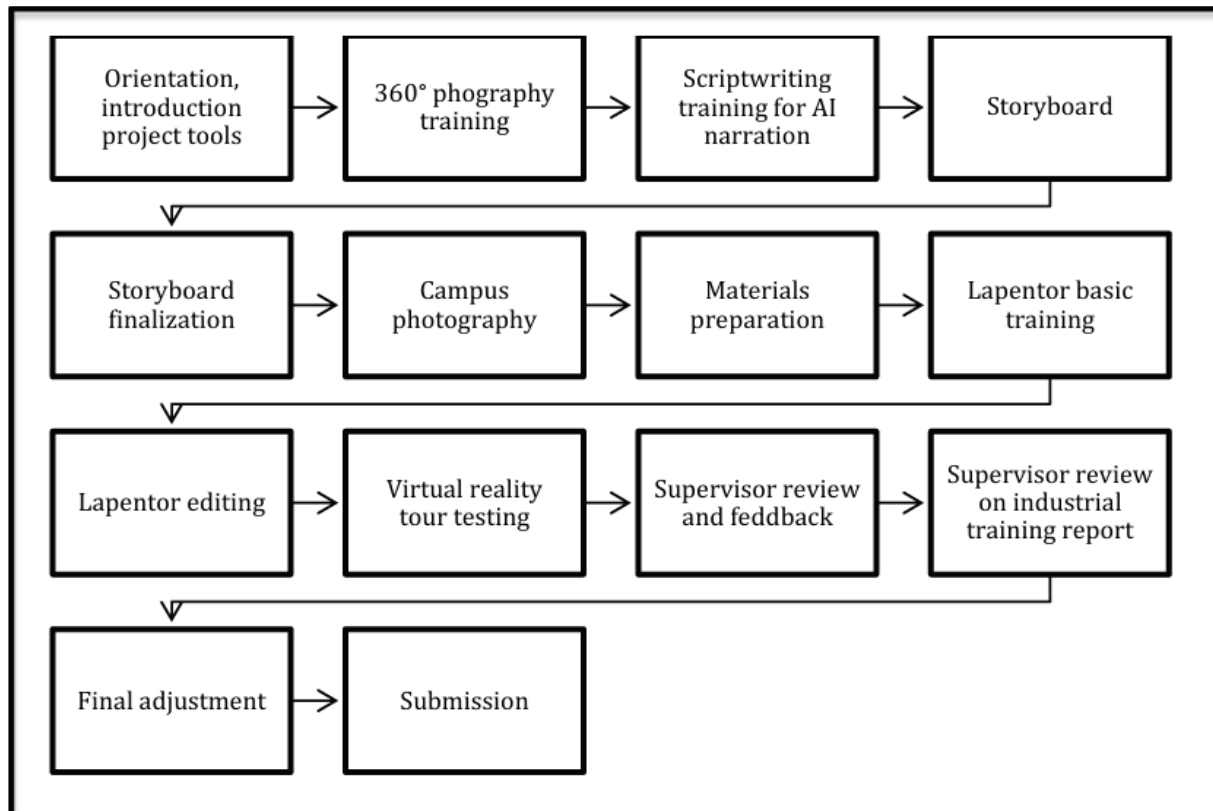


Figure 2. Flowchart illustrating the supervisor-student process during the development of the Interactive 360° Virtual Campus Tour project

CONCLUSION

The Virtual Reality for Sustainable In-Site Learning project demonstrates how immersive technologies can transform industrial training into a more sustainable, scalable, and inclusive model. By integrating 360° imaging, AI-driven narration, and interactive VR design, the project enables students to bridge the gap between theory and practice while minimising environmental impact. The outcomes show that VR enhances employability, fosters digital adaptability, and strengthens higher education's role in advancing national resilience and the global sustainability agenda. This initiative contributes directly to several United Nations Sustainable Development Goals (SDGs): SDG 4 (Quality Education) by promoting inclusive, technology-driven pedagogy; SDG 8 (Decent Work and Economic Growth) by equipping students with industry-relevant digital skills; SDG 9 (Industry, Innovation, and Infrastructure) by advancing immersive digital learning infrastructure; and SDG 12 (Responsible Consumption and Production) by reducing the material and environmental costs associated with conventional training.

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