ICTeD 2024: 2024 International Conference on TVET Excellence & Development (ICTeD)

O (*Opening Ceremony (On-Site/Hybrid: Malaysian Time (GMT+8))*)

Session time	Monday, 09:00 am until 09:15 am
Location	Seminar Hall, Online Room 1 (https://bit.ly/ICTeD2024DAY1)

ICTeD 2024: 2024 International Conference on TVET Excellence & Development (ICTeD)

KS1 (*Keynote Speech 1 (On-site/Hybrid: Malaysian Time (GMT+8))*)

Session time	Monday, 09:15 am until 10:00 am
Location	Seminar Hall, Online Room 1 (https://bit.ly/ICTeD2024DAY1)
Talk time	45
Chaired by	Shakir Saat (Universiti Teknikal Malaysia Melaka, Malaysia)

ICTeD 2024: 2024 International Conference on TVET Excellence & Development (ICTeD)

Coffee Break

Session time	Monday, 10:00 am until 10:20 am
Location	

ICTeD 2024: 2024 International Conference on TVET Excellence & Development (ICTeD)

KS2 (*Keynote Speech 2 (On-site/Hybrid: Malaysian Time (GMT+8))*)

Session time	Monday, 10:20 am until 11:05 am
Location	Seminar Hall, Online Room 1 (https://bit.ly/ICTeD2024DAY1)
Talk time	45
Chaired by	Muliati Sedek (University Technical of Malaysia Melaka, Malaysia)

ICTeD 2024: 2024 International Conference on TVET Excellence & Development (ICTeD)

Day 1 Session 1 (On-Site/Hybrid: Malaysian Time (GMT+8))

Session time	Monday, 11:15 am until 01:00 pm
Location	Seminar Hall, Online Room 1 (https://bit.ly/ICTeD2024DAY1)
Talk time	12
Chaired by	Muliati Sedek (University Technical of Malaysia Melaka, Malaysia)

11:15 am: *Enhancing Personalized Learning in Engineering Education Through TUAH Digital Portfolio: A Framework for Equitable TVET in Malaysia*

Nurulfajar Abd Manap (Universiti Teknikal Malaysia Melaka, Malaysia); Anis Suhaila Mohd Zain (Universiti Teknikal Malaysia Melaka, Malaysia); Abd Halim Zakiah (Universiti Teknikal Malaysia Melaka, Malaysia); Azma Putra (Curtin University, Australia)

Abstract: The integration of digital technology in Technical and Vocational Education and Training (TVET) is crucial for preparing a skilled workforce aligned with Industry 4.0 demands. This paper introduces the TUAH Digital Portfolio framework, a novel approach to fostering personalized learning and systematically documenting student achievements in engineering education. The framework leverages digital tools to cater to diverse learning preferences and enhance student engagement through the creation and curation of digital portfolios. By utilizing Apple's ecosystem and native applications, the study developed original digital content for selected engineering courses, incorporating multimedia elements and interactive components. The research involved a mixed-method approach, assessing the impact of the digital portfolios on student performance, motivation, and employability. Findings indicate that the TUAH Digital Portfolio not only supports personalized learning but also provides a comprehensive repository of student competencies, thereby enhancing their visibility and employability. This study underscores the potential of digital portfolios as a transformative tool for equitable TVET education, promoting both academic excellence and workforce readiness in the context of Malaysia's evolving educational landscape.

11:27 am: *Enhanced Phonocardiogram Analysis Through Troponin Test for the Myocardial Injury Detection*

Ira Puspasari (Institut Teknologi Bandung & Universitas Dinamika, Indonesia); Tati Erawati Rajab (Institut Teknologi Bandung, Indonesia); Agung W. Setiawan (Institut Teknologi Bandung, Indonesia); Miftah Pramudyo (Padjajaran University, Indonesia); Nobuo Watanabe (Shibaura Institute of Technology, Japan); Trio Adiono (STEI ITB, Indonesia)

Abstract: Myocardial Infarction (MI) is a condition that necessitates prompt medical intervention. Current examinations using ECG and Troponin-test have the disadvantage of diagnosing MI. Phonocardiograms (PCG) represent the physiological and pathological cardiac, with the data acquisition each cycle being 0.8 s. This research aims to develop a non-parametric correlation model between PCG-MI signal feature results and the troponin tests. The signals were obtained using an electronic stethoscope. The acquired signals in (.wav) were extracted into each cycle, time, and statistical domain features. Twelve selected features were tested for normality of distribution using Saphiro- Wilk. The Principal component regression was used to model the relationship between the feature and troponin test. Then, we found that 12 features were categorized into non-normal distributions. The correlation test between STEMI and NSTEMI features resulted in insignificant correlations, suggesting the model's feasibility. The proposed principal component modeling achieved an accuracy of 91.07%. Multivariate analysis, aligning with earlier studies on the features of PCG signals, has been represented by transfer functions. This study can serve as a basis for clarifying patients exhibiting pathological symptoms for MI detection.

11:39 am: *A Systematic Literature Review on Recent Peer Code Review Implementation in Education*

Huzaifah Ismail (Asia Pacific University of Innovation and Technology, Malaysia); Shahrinaz Ismail (Asia Pacific University of Technology & Innovation (APU), Malaysia); Muhammad Nur Affendy Nor'a (Asia Pacific University of Technology and Innovation, Malaysia); Jeffery Jeselee Sijore (Asia Pacific University of Technology and Innovation, Malaysia); Ainul Hazmin Hamid (Asia Pacific University of Technology and Innovation, Malaysia)

Abstract: Regardless of the years of implementation, peer assessment is still with some limitations and could be applied to technical courses like computer science and software engineering, as much as theoretical courses are covered by most research. To add salt to this, the trend among the digital natives of the current generation of tertiary education students has brought up the need to explore gamification in learning and teaching assessments. This paper presents a systematic literature review on peer code review implementation in education, which highlights recent articles found from 2019 to 2024 on the related domain. Significant findings emerged from the search on six databases of scholarly articles as three categories of peer code review studies are found, namely empirical, approach-focused, and system-based implementation. These categories are further defined to differentiate the studies in terms of methods. The expected outcome of this study is to open a new path towards research on peer code review methods, which would include the elements appreciated by the new generation, such as gamification.

11:51 am: *Integrating Computational Thinking Skills in Secondary Education: a Feasibility Study*

Khadijah Wan Mohd Ghazali (Universiti Teknikal Malaysia Melaka, Malaysia); Mashanum Osman (Universiti Teknikal Malaysia Melaka, Malaysia); Zuraini Othman (University Teknikal Malaysia Melaka, Malaysia); Masitah Seikh Omar (Sekolah Menengah i-Musleh, Malaysia)

Abstract: This feasibility study investigates the practicality of incorporating computational thinking (CT) education into secondary school curricula, aiming to equip students with essential 21st-century skills. The study assesses the readiness of educational institutions, teachers, and students to embrace CT as an integral part of their learning journey, identifying potential challenges and barriers to successful implementation. To achieve these objectives, the research examines the existing landscape of CT education, evaluates teacher preparedness, analyse student receptiveness, and explores resource requirements and best practices from around the world. As part of this investigation an immersive learning approach will be integrated. A five-day training program was implemented, featuring a comprehensive curriculum that covered key CT concepts, problem-solving techniques, presentation skills, and problem-based learning aligned with Sustainable Development Goals. The program included pre- and post-surveys to measure students' understanding of CT concepts and practical projects to apply their learning. Results showed consistent improvement in students' self-reported understanding of CT skills and their ability to apply these

concepts to real-world problems. The study reveals that integrating CT into secondary education is not only necessary but also highly beneficial. The study emphasizes that a holistic educational reform, incorporating leadership, technology, and curriculum adjustments, is essential for the successful implementation of CT education. The study also highlights the importance of aligning CT education with current educational policies and trends, such as KSSM (Kurikulum Standard Sekolah Menengah - Secondary School Standard Curricular), which advocate for the inclusion of CT as a fundamental practice of science education. In conclusion, this study provides valuable insights and recommendations for educational policymakers, administrators, and educators interested in enhancing CT skills in secondary students.

12:03 pm: *A Review of Educational Value of MMOEG in Fostering Critical Thinking Skills Through Gameplay*

Nuraziera Mohd Hatta (Universit Teknikal Malaysia Melaka, Malaysia); Ibrahim Ahmad (Universiti Teknikal Malaysia Melaka, Malaysia); Mohd Hafiz Zakaria (Universiti Teknikal Malaysia Melaka, Malaysia); Nazreen Abdullasim (Universiti Teknikal Malaysia Melaka, Malaysia); Heru Murti (Gadjah Mada University, Indonesia)

Abstract: Students today are immersed in a world shaped by digital technology, and their learning environments must adapt accordingly. Critical thinking has often been mentioned as the skill needed in the 21st century. It is intended for educators to find innovative ways to promote such a characteristic development in students. Massively Multiplayer Online Educational Games (MMOEG) provide a vibrant platform for the enhancement of critical thinking skills through engaging and cooperative gameplay experiences. This paper aims to conduct a comprehensive review of the educational significance of MMOEG in the cultivation of critical thinking abilities. The review scrutinizes a range of studies that elucidate how MMOEG can compel students to engage in critical thought, execute strategic choices, and address intricate problems in real-time scenarios. Additionally, this paper tackles the obstacles educators encounter when attempting to incorporate MMOEG into conventional curricular frameworks and proposes strategies for mitigating these challenges. By presenting an overview of the primary advantages and potential limitations of MMOEG within the educational sphere, this review seeks to equip educators with insights on how to effectively leverage these games to augment students' critical thinking capabilities. The outcomes of this investigation may serve as a valuable resource for academic institutions endeavoring to implement innovative, technology-enhanced pedagogical approaches that adequately prepare students for the exigencies of the contemporary world.

12:15 pm: *Fostering Problem-Solving Skills: a STEAM-Oriented Framework for Engineering and Non-Engineering Majors*

Omar Alkhatib (United Arab Emirates University, United Arab Emirates); Meriem Rahmani (United Arab Emirates University, United Arab Emirates)

Abstract: This paper presents a comprehensive framework for developing problem-solving skills across various disciplines based on a three-step thinking process: provoke, develop, and predict. The framework uses inquiry questions as a means of stimulating critical thinking (a sub-skill of higher-order thinking skills) and, ultimately, engagement in the problem-solving mental process. The framework emphasizes active learning and cognitive engagement using learning verbs to engage students autonomously in their learning experience. The concept of the learning curve is integrated to illustrate how repeated exposure to problem-solving tasks leads to enhanced understanding and skill mastery. The preliminary results of a test that combined multiple-choice questions with a real-life case-based scenario indicate an improvement in students' ability to solve problems and the ability of the test to distinguish between different levels of problem solving among students. The development of the learning curve provides insight into the effectiveness of the instructional problem-solving strategy, emphasizing the importance of iterative learning and continuous assessment based on the specific learning verbs.

12:27 pm: *Simventure: Utilizing First Person Player Technology for Career Guidance in High School*

Nurul Nadia (Universiti Teknikal Malaysia Melaka, Malaysia); Ikmal Faiq Albakri Mustafa Albakri (Universiti Teknikal Malaysia Melaka, Malaysia); Mohd Khalid Mokhtar (Universiti Teknikal Malaysia Melaka, Malaysia); Farhan Mohamed (Universiti Teknologi Malaysia, Malaysia); Chan Vei Siang (Universiti Teknologi Malaysia, Malaysia); Muhammad Nur Affendy Nor'a (Asia Pacific University of Technology and Innovation, Malaysia)

Abstract: The increasing trend of high school kids aspiring to become internet influencers or depending solely on freelance jobs, while ignoring their studies, motivated this study. This project seeks to enhance students' awareness of their future by introducing Simventure. Simventure is an interactive simulation that has AI driven Non-Playable Characters who provide assistance on post-graduation options and career planning, enabling students to investigate diverse career trajectories through a first-person perspective. While exploring career guidance and interactive learning, Simventure also reflect the reality in the career world such as becoming pilot and marine biologist. Simventure follows the ADDIE methodology (Analysis, Design, Development, Implementation, and Evaluation) as the foundation of the project. It explores the development of Simventure, covering asset development and the integration of AI into NPCs within the simulation. The simulations were afterwards evaluated through both quantitative and qualitative methods, engaging high school students and expert specialists, by employing the System Usability Scale (SUS) and expert testing to determine the usability and overall effectiveness of Simventure.

12:39 pm: *Guess the Learning Type: A Micro-Designed Gamified Approach to Machine Learning Types*

Nur Zareen Zulkarnain (Universiti Teknikal Malaysia Melaka, Malaysia); Sharifah Sakinah Syed Ahmad (Universiti Teknikal Malaysia Melaka, Malaysia)

Abstract: Gamification has increasingly been adopted in teaching and learning, especially to boost student engagement and aid comprehension. Complex topics are often better understood when broken down into smaller micro-topics. This study explores the implementation of a micro-designed gamified approach, ``Guess The Learning Type" to enhance undergraduate students' understanding of machine learning types. Conducted over four semesters in an Artificial Intelligence course at a Malaysian public university, the activity leverages gamification elements such as competition, time constraints, points, and penalties to increase student engagement and promote collaborative learning. Students participate in group-based activities where they must identify machine learning types based on given scenarios. The competitive nature of the activity encourages active participation and quick thinking, while immediate feedback reinforces learning outcomes. This paper examines the design and execution of the activity, its impact on student engagement, and its effectiveness in improving comprehension of supervised, unsupervised, and reinforcement learning. Results indicate that the gamified activity significantly enhances both engagement and understanding, offering a practical and alternative approach to teaching complex topics in machine learning.

ICTeD 2024: 2024 International Conference on TVET Excellence & Development (ICTeD)

L1 (*Lunch*)

Session time	Monday, 01:00 pm until 02:15 pm
Location	

ICTeD 2024: 2024 International Conference on TVET Excellence & Development (ICTeD)

Day 1 Session 2 (On-Site/Hybrid: Malaysian Time (GMT+8))

Session time	Monday, 02:15 pm until 03:30 pm
Location	Seminar Hall, Online Room 1 (https://bit.ly/ICTeD2024DAY1)
Talk time	12
Chaired by	Muliati Sedek (University Technical of Malaysia Melaka, Malaysia)

02:15 pm: *Structured Database Design for iDSS-ProLean a Decision Support System for Lean Semiconductor Manufacturing*

Nur Ain Qistina Muhammad Shafee (Universiti Teknikal Malaysia Melaka, Malaysia); Effendi Mohamad (Universiti Teknikal Malaysia Melaka, Malaysia); Mohd Soufhwee Abd Rahman (Mohd Soufhwee Abd Rahman, Malaysia); Nor Asmaa Alyaa Nor Azlan (Universiti Teknologi Malaysia, Malaysia); Mohd Hamdi Bin Abd Shukor (University of Malaya, Malaysia); Rudi Nurdiansyah (Universitas Negeri Malang, Indonesia)

Abstract: This work describes the thorough planning and execution of a structured database for the intelligent decision support system (DSS) called iDSS-ProLean, which was created to maximise semiconductor manufacturing lines. SMED (Single-Minute Exchange of Dies), Kanban, and Line Balancing are just a few of the critical lean manufacturing technologies that are supported by the carefully designed database. An IoT interface layer is also included for real-time data collection from the factory floor. Critical operations like etching, cutting, and assembly are handled by the system, which has database tables made specifically for efficient data management and resource allocation. The database structure ensures smooth communication across several manufacturing stages by including essential components including machinery, labour, and production data. By streamlining data flow and providing a robust platform for decision-making, this work demonstrates how the structured database enhances iDSS-ProLean's ability to manage production resources, improve efficiency, and meet demand targets more effectively in semiconductor manufacturing environments.

02:27 pm: *Employers' Perspectives on Skills Falling Short, HEIs' Education System, and Graduates' Attributes*

Hasan Saleh (Universiti Teknikal Malaysia Melaka, Malaysia); Nurul Asmida Abdul Wahab (Universiti Teknikal Malaysia Melaka, Malaysia)

Abstract: This study tries to identify the importance of employability skills that engineers falling short, HEIs' education system, and the important graduates' attributes from the perspectives of employers in Malaysia. There is lack of indications regarding the specific skills required by engineers in the industry, the quality of education system in the country,

and the graduate attributes that make up the employability among graduates. Quantitative method is used in this study, and 140 questionnaires were distributed to the senior managers at organizational level in company located at Penang, Malaysia. The survey data were extracted using Statistical Package for Social Science (SPSS) software version 29. Findings indicated employers agreed that engineers must be able to use and keep up with emerging technologies in engineering practice. The results suggest that Higher Education Institutions (HEIs) should update, improve, and deliver the skills with latest industry requirements to make fresh graduates more work-ready. Findings also revealed, the important graduates' attributes to the industry are the ability to balance knowledge, skills, personality, and attitudes. It is hoped that these data can be an essential reference for engineers, HEIs, and graduates to prepare themselves and take shared responsibility, especially in this challenging economic situation.

02:39 pm: *Enhancing TVET Graduate Employability Through AI Integration: An AHP Analysis in the End-Of-Life Vehicle Sector*

Mohd Khairul Nizam Bin Suhaimin (Universiti Teknikal Malaysia Melaka & Durian Tunggal, Melaka, Malaysia); Ahmad Fadzil Bin Mohamad (Universiti Teknikal Malaysia Melaka, Malaysia)

Abstract: The emergence of Artificial Intelligence (AI) in recent years has brought about substantial changes in several industries, including the End-of-Life Vehicle (ELV) sector by optimizing processes such as vehicle dismantling, material classification, and recycling. As AI progresses, it is crucial for Technical and Vocational Education and Training (TVET) institutions to ensure that its graduates possess the essential AI skills in order to improve their chances of finding employment. However, the integration of AI into TVET programs and its impact on graduate employability remains underexplored, especially within the ELV sector. The purpose of this paper is to examine and evaluate the crucial factors that enhance the job prospects of TVET graduates in the ELV industry by incorporating AI technology. Through the application of the Analytical Hierarchy Process (AHP), a thorough examination was carried out on 27 factors that were classified into different categories. These categories include Curriculum Integration, Industry-driven, AI Applications, Ethics & Sustainability and AI Management. The study prioritizes the top factors including AI integration into curricula, hands-on training with AI tools, industry collaboration, AI-driven predictive maintenance, and process optimization. The findings offer practical insights for TVET institutions and industry stakeholders to align educational strategies related to AI with industry demands. This will ultimately improve the job prospects of graduates in the ever-changing ELV sector.

02:51 pm: *Comparative Analysis of TVET Instructor Competency Standards: Insights From Malaysia and Beyond*

Maznizam Bin Mansor (Universiti Tun Abdul Razak, Malaysia); Zulkifflee Bin Mohamed (Universiti Tun Abdul Razak, Malaysia); Mohammed Reyasudin Basir Khan (Universiti Tun Abdul Razak, Malaysia); Mohd Nor Azlan Bin Mohamed Sidek (Universiti Tun Abdul Razak, Malaysia)

Abstract: The competency standards for Technical and Vocational Education and Training (TVET) instructors are crucial in ensuring the delivery of quality education and training, which supports the development of a skilled workforce. In Malaysia, the National Occupational Skills Standard (NOSS) - TVET Instruction, developed by the Department of Skills Development (DSD), serves as the benchmark for preparing instructors to meet industry demands and contribute to national economic growth. However, as global standards evolve, it is essential to assess how NOSS compares with other established frameworks, including the TVET Teaching Competency (TTC) by the Malaysian Qualifications Agency (MQA) and the Regional TVET Teacher Standard for ASEAN (RTTS) by SEAMEO VOCTECH and GIZ. This study conducts a comparative analysis of these three competency frameworks, aiming to identify strengths, areas of alignment, and opportunities for improvement within the NOSS framework. The findings reveal that while NOSS is well-tailored to Malaysia's specific industrial and educational needs, there are opportunities to integrate broader competencies, such as digital pedagogical skills and continuous professional development, which are

emphasized in the TTC and RTTS frameworks. Based on this analysis, several recommendations are made to enhance the NOSS framework, ensuring that Malaysia's TVET instructors are equipped with both technical expertise and the adaptability required to meet the evolving demands of the global workforce.

03:03 pm: *Sustainable Skills Development in Electric Vehicle Technology: TVET Institutions as Catalysts for Global Advancement*

Yee Siew Ching (University Teknologi Malaysia & ELITE ACADEMY GROUP SDN BHD, Malaysia); Ikenna Ignatius George (Universiti Teknologi Malaysia, Malaysia); Aede H Musta'amal (Universiti Teknologi Malaysia, Malaysia); Temitope Teniola Onileowo (Universiti Teknologi Malaysia, Malaysia); YU Qian Zhai (Universiti Teknologi Malaysia, Malaysia)

Abstract: The emergence of electric vehicle (EV) technology has become a crucial factor in the global economy and is closely tied to the development of technical and vocational education and training (TVET) institutions. This review paper explores the role of technical and vocational education and training (TVET) in promoting sustainable development and social equity. Employing a systematic literature review approach, leveraging a range of secondary data sources, such as peer-reviewed academic articles and industry reports. Reviewed findings indicates that despite progress, gaps persist in preparing the workforce for emerging industries and insufficient social fairness. The study offers recommendations to instructors, policymakers, and industry leaders on integrating sustainability into TVET curricula, policies, and partnerships to enhance its impact on sustainable development.

03:15 pm: *The Impact of Internships on Diploma of Chemical Engineering Students: a Case Study of Politeknik Tun Syed Nasir Syed Ismail*

Nurul Suhada Ismail (Malaysian Research and Education Foundation, Malaysia); Nur Aina Makhtarudin (Malaysian Research and Education Foundation, Malaysia); Tengku Fattnin Alya' Tengku Kamaruzaman (Politeknik Tun Syed Nasir, Malaysia)

Abstract: This study explores the impact of internships on Diploma in Chemical Engineering students at Politeknik Tun Syed Nasir Syed Ismail, with a focus on professional competencies, soft skills, and academic learning. Based on interviews with seven students, findings show that 45% of their development was linked to professional and technical skills, 35% to soft skills like communication and adaptability, and 20% to academic knowledge application. The results highlight the importance of internships in bridging academic learning with industry practice and suggest curriculum improvements, such as integrating IT skills and strengthening communication training.

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Tea Break

Session time	Monday, 03:30 pm until 03:45 pm
Location	

ICTeD 2024: 2024 International Conference on TVET Excellence & Development (ICTeD)

Day 1 Session 3 (On-Site/Hybrid: Malaysian Time (GMT+8))

Session time	Monday, 03:45 pm until 05:30 pm
Location	Seminar Hall, Online Room 1 (https://bit.ly/ICTeD2024DAY1)
Talk time	12
Chaired by	Muliati Sedek (University Technical of Malaysia Melaka, Malaysia)

03:45 pm: *ALMUSTRA: an Augmented Reality Application for Introducing Indonesia Traditional Musical Instruments*

Evangs Mailoa (Universitas Kristen Satya Wacana, Indonesia)

Abstract: Traditional Indonesian musical instruments reflect the richness and diversity of culture and are an integral part of people's lives. However, in recent decades, it has faced challenges in preserving and introducing it to the younger generation. Arts and Culture teachers in Junior High School at Salatiga face difficulties in showing examples of the shapes and sounds of traditional musical instruments from various regions in Indonesia. Augmented reality (AR) technology is emerging as an innovative tool to introduce and preserve local knowledge about traditional musical instruments. This research uses a mixed-method approach which combines qualitative and quantitative data collection. Data collection was carried out through semi-structured interviews with junior high school arts and culture teachers. For system development, the Multimedia Development Life Cycle (MDLC) method is used with the aim of producing multimedia learning products. This research resulted in an Android application called ALMUSTRA: Introduction to Traditional Musical Instruments Based on Augmented Reality. ALMUSTRA is a learning product that helps introduce Indonesian traditional musical instruments, equipped with 3D images, sounds, and quizzes as gamification to make the teaching and learning process more interesting.

03:57 pm: *Analysis of Student Engagement Towards Learning Materials in Learning Management System: A Case Study*

Zarina Mohd Noh (Universiti Teknikal Malaysia Melaka, Malaysia); Norhidayah Mohamad Yatim (Universiti Teknikal Malaysia Melaka, Malaysia); Wira Hidayat bin Mohd Saad (Universiti Teknikal Malaysia Melaka, Malaysia); Rostam Affendi Hamzah (Universiti Teknikal Malaysia Melaka & FTK, Malaysia); Syafeeza Ahmad Radzi (Universiti Teknikal Malaysia Melaka, Malaysia); Noor Hafizah Abdul Aziz (Universiti Teknologi MARA (UiTM) Malaysia & Universiti Putra Malaysia, Malaysia)

Abstract: The use of learning management system nowadays in higher learning institution allows students to experience the learning process outside of its scheduled face-to-face class. As such, it is interesting to observe the students' engagement with the learning materials uploaded on the learning management system. Furthermore, are the interactivity in the materials affects the student engagement with it? Based on the learning materials uploaded in Moodle platform utilized in our university as the learning management system, an analysis was done to the analytics recorded in two sessions for a Digital System course delivered to bachelor's degree student in our faculty. The finding shows that on average, the students' engagement for materials grouped under Resources reached the highest engagement percentage that are 73.72% and 79.46% for the two sessions respectively, compared to the materials grouped under Activities (59.96% and 75.00%), and Assessments (52.90% and 73.52%). The trend is consistent for both semesters, although the average percentage was different. As observed from the findings, the students' engagement with the learning materials uploaded online depends on the student's perceived importance of the materials; whether it help them increase their understanding of the course content or not regardless to the levels of interactivity in the materials.

04:09 pm: *Applying TOPSIS Algorithm for Odour Classification Model*

Muhammad Shahkhir Mozamir (Universiti Teknikal Malaysia Melaka, Malaysia); Muhammad Fuad Abdullah (SEGi University Sdn Bhd, Malaysia, Malaysia); Asniyani Nur Haidar Abdullah (Universiti Teknikal Malaysia Melaka (UTeM), Malaysia); Muhammad Faizan Jamaluddin (SEGi University Sdn Bhd, Malaysia)

Abstract: Odour classification is a complex task with significant implications across various industries in Industrial Evolution 4.0 (IR4.0), including food and beverage, environmental monitoring, and perfumery. Traditional methods often struggle with subjectivity and the multidimensional nature of odour data. This paper introduces an approach by applying the Technique for Order Preference by Similarity to Ideal Solution (TOPSIS) algorithm for odour classification. TOPSIS, a widely-used as multi-criteria decision-making (MCDM) method, ranks alternatives based on their proximity to an ideal solution, effectively handling both qualitative and quantitative data. In this study, we outline the integration of TOPSIS for odour classification that can be applied in application for future. Simulation datasets comprising sensory evaluations were utilised to validate the approach. The idea is the highest ranking, the closeness of testing data to the model trained. The results demonstrate that the TOPSIS-based classification method proved can be applied for odour classification. By systematically evaluating multiple criteria influencing odour perception, our approach offers a robust, reliable, and efficient solution for odour classification challenges.

04:21 pm: *Building Strong Foundations in C++: Scaffolded Exercises With CodeRunner*

Maslita Abd Aziz (Universiti Teknikal Malaysia Melaka, Malaysia); Ahmad Shaarizan Shaarani (Universiti Teknikal Malaysia Melaka, Malaysia); Safiza Suhana Kamal Baharin (Universiti Teknikal Malaysia Melaka, Malaysia); Zahriah Othman (Universiti Teknikal Malaysia Melaka (UTeM), Malaysia); Nor Hafeizah Hassan (Universiti Teknikal Malaysia Melaka, Malaysia)

Abstract: Programming students often struggle with debugging and problem-solving due to limited feedback during learning. This study addresses these challenges by integrating CodeRunner, an automated assessment tool, with the PSIF framework to scaffold skill development. The objective was to enhance foundational, developmental, and mastery-level programming competencies. Through structured exercises on ULearn Moodle platform, students progressed from basic to advanced tasks, achieving significant improvements in success rates (e.g., 60% to 90% for complex exercises). CodeRunner's real-time feedback and iterative approach enabled self-directed learning and error correction. This study highlights the potential of structured, feedback-driven learning to improve programming education outcomes effectively.

04:33 pm: *SPARC: a Framework for Enhancing Reading Through Augmented Reality, Conversational AI, and IDC Theory*

Masood Azhar (Multimedia University, Malaysia); Soon Hin Hew (Multimedia University, Malaysia); Tse Kian Neo (Multimedia University, Malaysia)

Abstract: Augmented reality (AR) and conversational artificial intelligence (ConvAI) are emerging technologies with significant potential to transform the educational landscape. However, AR content tailored for early childhood education often prioritizes entertainment over academic value and lacks alignment with curriculum standards. This paper introduces SPARC (System for Personalized AR and Reading with ConvAI), a novel conceptual framework designed to enhance early childhood reading experiences. Grounded in interest-driven creator (IDC) theory, SPARC leverages AR to capture attention through interactive visuals and ConvAI to facilitate dynamic, personalized conversational learning. By aligning educational content with children's intrinsic interests, SPARC redefines reading as an interactive journey that fosters motivation, engagement, and skill development. This paper presents the theoretical foundations, design components, and conceptual framework of SPARC, demonstrating its potential to address critical gaps in current educational technologies and revolutionize early childhood education

04:45 pm: *Enhancing TVET Blended Learning Student Engagement Through Geo-Attendance*

Safiza Suhana Kamal Baharin (Universiti Teknikal Malaysia Melaka, Malaysia); Maslita Abd Aziz (Universiti Teknikal Malaysia Melaka, Malaysia); Zahriah Othman (Universiti Teknikal Malaysia Melaka (UTeM), Malaysia); Nor Mas Aina Md. Bohari (Universiti Teknikal Malaysia Melaka, Malaysia)

Abstract: Blended learning in Technical and Vocational Education and Training (TVET) contexts provides flexibility, but it frequently faces issues in retaining student engagement. This study investigates the use of a geo-attendance approach to analyse attendance patterns, with a focus on location-based engagement (on- campus vs. off-campus) and demographic variables such as gender, race, age, and internet connectivity. This study introduces the Blended Attendance and Learning Analysis System (BALAS), a geo-attendance platform that uses spatial and demographic data to provide meaningful insights into student participation. The study uses heat maps and interactive dashboards to identify important trends and difficulties in a five-week blended learning program. The results demonstrate that out-of-campus students, particularly those with limited internet connection, suffer considerable impediments to participation. The findings highlight the significance of tailoring interventions to bridge engagement.

04:57 pm: *Teaching Factory 2.0: The New Approach to Teaching Factory Concept*

Hambali Boejang (UTeM, Malaysia); Syahrul Azwan Sundi@Suandi (Universiti Teknikal Malaysia Melaka (UTeM) & Faculty of Mechanical & Manufacturing Engineering Technology, Malaysia); Amir Hamzah Abdul Rasib (Universiti Teknikal Malaysia Melaka, Malaysia); Umi Hayati Ahmad (Universiti Teknikal Malaysia Melaka, Malaysia); Lailatul Harina Paijan (UTeM, Malaysia); Muhammad Zahir Hassan (Universiti Teknikal Malaysia Melaka & Eindhoven University of Technology, Malaysia)

Abstract: This study presents the new approach to the teaching factory concept that the Teaching Factory of Universiti Teknikal Malaysia Melaka has adopted. Teaching Factory (TF) provides technical knowledge and skills from industry to manufacturing engineering students. However, in Malaysia, the active involvement of industries in education is insufficient. Moreover, the practical project from the industry used in the classroom as the case study is constrained by the duration of each semester. However, a teaching factory with qualified educators offers an opportunity for the TF to play the role of the industrial partner to the faculty. Similarly, a new product development project can be introduced for the students to indulge in real experimental learning that was set between 3 to 4 semesters. The learning process exposed the students to theories and experiences, conducted by qualified educators and industrial partners through seminars and practical sessions. The students were formed as the product development team. The product development process started with the design brief and ended with a pre-production prototype. The performance of the product development project was based on its effectiveness and efficiency. The effectiveness was measured through customer acceptance, represented by intellectual property registration, and awards received. Meanwhile, the efficiency was represented by the product development lead time required to fabricate the intended functional prototype. The new concept of TF implementation is considered successful and significantly beneficial to the participants or students. The new concept has also developed the ability of the students to work together and generate the 3D CAD data, engineering build-of-material (E-BOM), and

operation management documents related to manufacturing engineering. The new approach to TF is named Teaching Factory 2.0. It is a viable conceptual approach to the existing teaching factory concept since it integrates holistically the main pillars of knowledge: education, research, and innovation.

05:09 pm: *A Curriculum Development Framework for Work-Integrated Learning and Apprenticeships in Higher Education*

Tamilselvan Mahalingam (Higher Colleges of Technology, United Arab Emirates); Ahmed Ghonim (Higher Colleges of Technology, United Arab Emirates); Minerva Bunagan (Higher Colleges of Technology, United Arab Emirates)

Abstract: Work-integrated learning (WIL) and apprenticeships are key strategies in higher education, bridging academic theory and industry practice to enhance graduate employability. This paper explores the approach adopted by the Higher Colleges of Technology (HCT) to redesign academic programs by embedding WIL principles and a year-long apprenticeship. The restructuring involved reducing program credits to accommodate WIL, recalibrating credit hours, and introducing work-integrated courses within a competency-based framework aligned with national and international accreditation standards. The paper outlines a structured approach to embedding WIL and apprenticeships into academic programs, focusing on curriculum redesign and credit adjustments to integrate workplace-based learning. This case study provides a scalable framework for institutions seeking to enhance graduate employability and foster stronger industry partnerships through effective WIL integration.

05:21 pm: *FSM Design Techniques for Stable State Transitions Under Fast Clocks: a Pedagogical Approach*

Fajar Suryawan (Universitas Muhammadiyah Surakarta, Indonesia)

Abstract: The notion of state machine is a fundamental concept in digital design, particularly when using Field Programmable Gate Arrays (FPGAs). However, the typical undergraduate curriculum often explains state transitions in Finite State Machines (FSMs) without adequately addressing the impact of fast clock speeds. This gap in instruction can lead to design issues, especially when consecutive state transitions are expected to occur based on the same input signal. A common pitfall for students is the "fall-through" phenomenon, where the fast clock causes unintended state advancements because the flip-flop registers the input as active for multiple cycles. This paper aims to enhance the understanding of FSM design among electrical and computer engineering undergraduates by addressing this specific challenge. We present a detailed methodology for designing FSMs that correctly handle consecutive state transitions triggered by a single input signal. The approach includes explanations and implementations using VHDL and Verilog, supported by hardware block diagrams. Our goal is to not only benefit students in grasping this critical aspect of FSM design but also to provide valuable insights for authors of digital design textbooks, ensuring that educational materials better reflect practical considerations in digital systems.

ICTeD 2024: 2024 International Conference on TVET Excellence & Development (ICTeD)

Day 2 Parallel Session 1 (On-Site/Hybrid: Malaysian Time (GMT+8))

Session time	Tuesday, 09:00 am until 11:00 am
Location	Online Room 2 (https://bit.ly/ICTeD2024DAY2_A)
Talk time	12
Chaired by	Siti Rosmaniza Ab Rashid (Universiti Teknikal Malaysia Melaka, Malaysia)

09:00 am: *The Gamification Effect of Simplifying Complex Mathematics and Statistics Concepts: A Case Study of Online Game-Based Quiz Tools*

Noureen Talpur (University Teknologi PETRONAS, Malaysia)

Abstract: Many studies indicate that complex subjects and poor exam performance often contribute significantly to student anxiety. In this era of rapid technological advancements, the teaching approach should evolve by incorporating engaging, game-based tools that attract students and assist in mastering complex topics. These tools not only enhance student engagement but also make learning more accessible and easier to understand. Therefore, this study examines the effectiveness of Blooket, an innovative tool for improving students' comprehension of complex mathematics and statistics while reducing their anxiety. By integrating interactive and engaging elements into educational quizzes, Blooket significantly enhances student engagement, motivation, and learning outcomes. The findings of the study demonstrated the successful implementation of this strategy, with positive student feedback highlighting its potential to transform attitudes toward complex subjects like mathematics and statistics. This approach makes the learning experience more enjoyable and productive, encourages a supportive learning environment, and ultimately promotes academic success in challenging subjects.

09:12 am: *Bridging the Virtual and Hands-On Laboratories for Small Signal Amplifier Circuits*

Wahidah Abd. Halim (Universiti Teknikal Malaysia Melaka, Malaysia); Dinesh Subanthiran (Universiti Teknikal Malaysia Melaka, Malaysia); Siti Azura Ahmad Tarusan (Universiti Teknikal Malaysia Melaka, Malaysia); Auzani Jidin (Universiti Teknikal Malaysia Melaka, Malaysia); Muhammad Zaim Mat Rosdi (Universiti Teknikal Malaysia Melaka, Malaysia); Muhammad Rabani Mohd Ali (Universiti Teknikal Malaysia Melaka, Malaysia)

Abstract: This paper presents an innovative approach to teach bipolar junction transistor (BJT) small signal amplifier circuits in the laboratory, with a focus on simplifying the learning process for undergraduate students. In traditional Analog Electronics laboratory, students often face difficulties in constructing analog electronics circuits on breadboard, sometimes struggling even to begin the experiment. While BJT small signal amplifiers may appear to be a basic analog electronics application, they remain one of the more challenging circuits for students to successfully assemble during lab sessions. To further enrich the educational experience, a multifaceted instructional approach is proposed. Tinkercad was utilized as an educational tool, effectively bridging the gap between theoretical concepts and practical application to enhance understanding of BJT small signal amplifier configurations. Furthermore, EasyEDA was used to design a custom printed circuit board (PCB) for integration of BJT small signal amplifier configurations onto an educational trainer board. These configurations comprised common-emitter, common-collector, and common-base amplifiers. This trainer board aims to streamline the hands-on experience, enrich students' knowledge and competencies, and reduce the learning time taken to understand the small signal amplifier circuit concept.

09:24 am: *Project-Based Learning Implementation in Distance Learning*

Shiyrah Theosebes Sela (Bina Nusantara University, Indonesia); Joice Yulinda Luke (Bina Nusantara University, Indonesia)

Abstract: Education globally shows significant and vast changes. Pandemic has forced education fields to admit that distance learning becomes important part in higher education. This paper aims to show the implementation of Project-Based Learning in distance learning with the challenges and solutions that were experienced by the students in completing their project as Business Management students in online learning. Distance learning uses Learning Management System to facilitate the teaching-learning process. This research used mixed-methods approach to manage the collected data. The data was collected through online questionnaire named Google Form to students with the group assignments and learning method such as Project-Based Learning through Learning Management System that facilitate them. Questionnaire consists of questions to gather data to answer Research Questions. By finding the answer to Research Questions will lead the students, the education practitioners, faculty members and others to have successful implementation of project-based learning in distance learning as this research, as the findings, provided the information of challenges as well as the solution in implementation of project-based learning in distance learning. The findings will enrich and support the decision makers to make correction preventive action in planning successful implementation of project-based learning in distance learning.

09:36 am: *Revolutionizing TVET Education: Tailored Methods for Tourism and Hospitality Skills*

Maria Theresa M Verian (Treston International College & Go Extreme Limit Corporation, Philippines)

Abstract: This study investigates the effectiveness of tailored pedagogical approaches in Technical and Vocational Education and Training (TVET) for tourism and hospitality education. As the industry demands a skilled workforce that possesses both technical and soft skills, traditional teaching methods often fall short in preparing students for real-world challenges. This research aims to explore the impact of customized teaching methods on skill acquisition, compare their effectiveness to conventional approaches, and analyze the role of industry partnerships and experiential learning in enhancing student preparedness. Using a mixed-methods approach, quantitative data were collected through Likert scale surveys from 100 TVET students, supplemented by qualitative interviews with industry stakeholders. Preliminary findings indicate that tailored teaching methods significantly improve technical skill development and increase student engagement compared to traditional classroom settings. Furthermore, the research highlights the necessity of industry collaborations to bridge the gap between education and employment, suggesting that experiential learning opportunities such as internships are vital in preparing students for the practical demands of the tourism and hospitality sectors. The implications of this study contribute to a deeper understanding of effective teaching strategies in TVET and provide recommendations for enhancing curricula to meet industry needs.

09:48 am: *3D Model AI Reconstruction Nusantara Building Based on Lalitavistara Borobudur Relief*

Ferric Limano (Bina Nusantara University, Indonesia); Lintang Widyokusumo (Bina Nusantara University, Indonesia); Sri Rachmayanti (Bina Nusantara University, Indonesia); Budsakayt Intarapasan (King Mongkut University of Technology Thonburi, Thailand)

Abstract: This research aims to generate architectural design recommendations based on the visual reconstruction of the Lalitavistara reliefs from Borobudur, addressing the urgent need for building designs that retain the distinctive character of Nusantara architecture. The proposed design is intended for application in Ibukota Nusantara Indonesia, integrating smart city and green city approaches while featuring a unique visual style that incorporates historical artifacts. This need arises from the current trend of building designs in Ibukota Nusantara Indonesia, which predominantly adopt an international style and lack the unique elements of Nusantara architecture. To address this, the research adopts a project-based methodology, utilizing blueprints derived from reconstructed Lalitavistara relief panels, developed through 3D modeling and further enhanced by digital imaging with the assistance of Artificial Intelligence (AI). The expected outcome of this study is to provide a method for designing buildings that showcase a distinctive Nusantara-Indonesian style, along with recommendations for a digital design workflow supported by AI to finalize 3D modeling visuals.

10:00 am: *Unveiling the Convenience and Drawbacks of Artificial Intelligence (AI) in Education*

Leo Lorzano Codilla, Jr (Caraga State University, Philippines); Rojen Lyneth Ampong (Caraga State University, Philippines); Princess Dianne Caparo (Caraga State University, Philippines); Theress Joy Romero (Caraga State University, Philippines)

Abstract: This study aims to examine the level of convenience of Artificial Intelligence (AI) for students in education in terms of personalized learning, enhanced engagement, accessibility, and inclusivity. It also explores the extent of the drawbacks of AI in education for students, considering neutrality, privacy concerns, the digital gap, and dehumanizing effects. The study looked into the significant differences between the convenience and drawbacks of Artificial Intelligence and the relationships between these factors. The study employed a descriptive-correlational research design. Results revealed that the correlation analysis between the level of convenience of Artificial Intelligence and the extent of its drawbacks shows a significant relationship. This entails that active use of AI in education contributes to students' learning while knowing its downfall. This is viewed as AI's role in education to have a balanced use. Regarding these results, it is essential to properly create policies and procedures to use AI in education. It will help enhance the student support system and encourage responsible AI development practices to manage the unforeseen drawbacks and ensure AI's ethical and efficient application in educational settings.

10:12 am: *Readiness and Challenges Faced by Elementary Public School Teachers on Information and Communication Technology (ICT) Integration in the Philippines*

Leo Lorzano Codilla, Jr (Caraga State University, Philippines); Kate Collien Agonas (Caraga State University, Philippines); Kristine Mae Canomay (Caraga State University, Philippines); Rea Goloran (Caraga State University, Philippines)

Abstract: This study examined the readiness and challenges teachers face in information and communication technology integration in the 21st-century classroom. The study looked into the difference between teachers' readiness and their challenges when grouped according to profile and the relationship between teachers' readiness and their challenges. The findings were utilized to develop intervention material. The study employed a descriptive-correlational research design. Results revealed that in terms of readiness, teachers have a strong capacity for incorporating multimedia elements into their teaching methodologies, potentially enhancing engagement and facilitating more interactive learning experiences

for students. However, the results also revealed that the extent of challenges is high, indicating that teachers severely hamper their ability to integrate ICT into their teaching practices effectively. Furthermore, it suggests a significant difference in the teachers' readiness and challenges in integrating ICT in 21st-century classrooms when grouped according to age, length of service, level assigned, and number of trainings attended. The findings emphasize the transformative potential of ICT in enhancing pedagogical practices, mainly through multimedia integration, which fosters increased student engagement and interactive learning. This study contributes to the advancement of educational leadership by informing the development of professional development programs to enhance educators' technological proficiency and self-efficacy.

10:24 am: *The Effectiveness of Integrating Information and Communication Technology (ICT) in the 21st-Century Classroom*

Leo Lorzano Codilla, Jr (Caraga State University, Philippines); Lyra G. Baldon (Department of Education, Philippines)

Abstract: The study aims to assess the efficacy of integrating Information and Communication Technology (ICT) as a pedagogical tool in fostering enhanced teaching and learning outcomes within 21st-century classroom environments. The study revealed moderate to high ICT skills among teachers. Moreover, the participants' effectiveness level of ICT integration is high. The study found a significant relationship between teachers' ICT skills and the level of effectiveness in integrating ICT in the classroom. Thus, teachers encounter several challenges integrating ICT in the new normal classrooms. This study provides critical insights into integrating Information and Communication Technology (ICT) in the new normal classrooms, highlighting the need for continuous professional development to enhance teachers' ICT competencies, as these directly impact the quality of technology-driven instruction.

10:36 am: *Development of ProSkiND Problem-Solving Framework Based on Non-Digital Games for Preschool Children*

Khadijah Anis (Universiti Tun Hussein Onn Malaysia & Fakulti Pendidikan Teknikal dan Vokasional, Malaysia); Alias Masek (Universiti Tun Hussein Onn Malaysia, Malaysia); Muhammad Nurtanto (Jakarta State University, Indonesia); Nur Kholifah (Yogyakarta State University, Indonesia); Nurhidayati Nurhidayati (Universitas Muhammadiyah Purworejo, Indonesia); Mustofa Abi Hamid (Universitas Sultan Ageng Tirtayasa & Universitas Negeri Yogyakarta, Indonesia)

Abstract: Problem-solving skills are essential for children to master as part of their developmental milestones, with teachers playing a crucial role in guiding this process through age-appropriate activities. However, the lack of structured frameworks and specialized reference materials poses challenges for effective implementation. This study aimed to develop the ProSkiND problem-solving framework based on non-digital games, designed to enhance preschool children's problem-solving abilities systematically. Using a Design and Development Research (DDR) approach, the study involved 12 experts in Early Childhood Education, problem-solving, and instructional design. Data were collected through the Nominal Group Technique (NGT) and analyzed using the Interpretive Structural Modelling (ISM) approach with Concept Star software to prioritize framework elements. The study identified five key components: activity objectives, teacher preparations, teacher roles, children's roles, and activity assessments, with their respective priority sequences. The findings emphasize the significance of clear instructional guidance, structured teacher preparations, and active child engagement to stimulate problem-solving. This framework provides a practical reference for preschool educators to implement non-digital game-based learning, enhancing instructional quality and fostering children's cognitive, social, and emotional development. The ProSkiND framework contributes to the field of early childhood education by addressing the gap in structured

10:48 am: *Technological Support to Foster Students' Learning Experience in Electrical Measurement Class: a Mobile Learning-Based Hypermedia Approach*

Mustofa Abi Hamid (Universitas Sultan Ageng Tirtayasa & Universitas Negeri Yogyakarta, Indonesia); Muhammad Nurtanto (Jakarta State University, Indonesia); D. Desmira (Universiti Teknikal Malaysia Melaka, Malaysia, Indonesia); Dedi Setiawan (Universitas Negeri Yogyakarta, Indonesia); Radinal Fadli (STKIP Muhammadiyah Muara Bungo, Indonesia); Muhammad Hakiki (STKIP Muhammadiyah Muara Bungo & Pendidikan Teknologi Informasi, Indonesia)

Abstract: This study aims to develop hypermedia products based on mobile learning to serve as instructional tools for the Electrical Measurement course. This study employs a Research and Development (R&D) approach utilizing the ADDIE development model, which encompasses Analysis, Design, Development, Implementation, and Evaluation. Data collection was conducted through interviews, questionnaires, and observation methods in the Electrical Measurement class. The study employed a nonprobability sampling technique, involving 30 respondents from the Department of Electrical Engineering Vocational Education, including media experts and material experts. The research findings indicate that the feasibility of learning media, as evaluated by media experts, received an average score of 90, categorizing it as "very feasible." Material experts assessed the feasibility with an average score of 94, also placing it in the "very feasible" category. Additionally, the feasibility regarding the use of learning media was scored at 78.1, which is similarly classified as "very feasible." Mobile learning-based hypermedia can enhance the learning experience of students in electrical measurement courses.

11:00 am: *Exploring the Adoption of IoT in Malaysian SMEs: Drivers, Barriers, and Strategic Insights*

Shakir Saat (Universiti Teknikal Malaysia Melaka, Malaysia)

Abstract: This research explores the adoption of Internet of Things (IoT) technologies across organizations of varying sizes and ages, with a focus on small-to-medium enterprises (SMEs) in Malaysia. The study identifies key drivers and barriers to IoT adoption, examining dimensions such as competitive pressure, government support, technical knowledge, and organizational readiness. Findings reveal that younger organizations and smaller SMEs are more proactive in adopting IoT, particularly Industrial IoT and Retail IoT, driven by efficiency needs and agility. Middle management plays a critical role in operationalizing IoT strategies, while lower staff engagement highlights gaps in inclusivity and training. Barriers such as cost, complexity, and compatibility persist, underscoring the need for targeted government incentives, sector-specific training, and scalable solutions. The results emphasize the pivotal roles of leadership, resource alignment, and external support in fostering broader and sustained IoT adoption.

ICTeD 2024: 2024 International Conference on TVET Excellence & Development (ICTeD)

Day 2 Parallel Session 2 (On-Site/Hybrid: Malaysian Time (GMT+8))

Session time	Tuesday, 09:00 am until 11:00 am
Location	Online Room 3 (https://bit.ly/ICTeD2024DAY2_B)
Talk time	12
Chaired by	Muliati Sedek (University Technical of Malaysia Melaka, Malaysia)

09:00 am: *Understanding the Definitions of Microcredentials in Higher Education: Systematic Literature Review*

Wihendro Wihendro (Bina Nusantara University, Indonesia); Harco Leslie Hendric Spits Warnars (Bina Nusantara, Indonesia); Harjanto Prabowo (Binus University, Indonesia); Sfenrianto Sfenrianto (Bina Nusantara University, Indonesia)

Abstract: The growing focus on microcredentials emphasizes the urgent need for precise and widely accepted definitions, as existing uncertainties hinder their effective implementation. This research aims to investigate the comprehension of microcredentials definitions in the context of higher education by conducting a systematic literature review. The goal is to identify current definitions of microcredentials to facilitate standardization initiatives. Following the PRISMA methodology to systematically search in scopus database within 2019-2024 resulting 940 articles, by removing the duplicates, 280 articles were initially reviewed, with 29 selected for detailed thematic analysis based on specific inclusion and exclusion criteria. By adapting the six phases of thematic analysis, selected articles were identified analyzed, organized, described, and themes found the data set were reported. Key findings reveal that, while a universally accepted definition is lacking, common themes emerge: microcredentials are competency-based, modular, portable, stackable, and often include quality assurance. These attributes highlight microcredentials as valuable for upskilling and reskilling in a flexible manner. The study concludes that establishing standard definitions can increase the recognition and utility of microcredentials across educational and professional sectors and recommends further research to strengthen core elements for consistency.

09:12 am: *Exploring Mathematics Teachers' Behavioral Intentions to Use Artificial Intelligence Through Structural Equation Modeling*

Evelyn B. Ballenas (Caraga State University, Philippines); Maris T. Lasco (Caraga State University, Philippines)

Abstract: This study investigated the factors that influence mathematics teachers' intentions to adopt artificial intelligence (AI) in their teaching practices. Using the Unified Theory of Acceptance and Use of Technology (UTAUT) framework, the study examined how facilitating conditions, effort expectancy, performance expectancy, and social influence, mediated by attitudes toward AI, impact teachers' behavioral intentions to integrate AI into teaching. An exploratory sequential mixed-methods approach, starting with qualitative interviews and focus groups, followed by a quantitative survey of 224 teachers was applied. Results show that while facilitating conditions and performance expectancy significantly shape positive attitudes toward AI, these attitudes strongly drive behavioral intentions. Additionally, Structural Equation Modeling (SEM) confirms that social influence and performance expectancy indirectly affect intentions through attitudes.

09:24 am: *The Perspective of Digital Burnout From Junior High School Teachers in Yogyakarta*

Dian Hidayati (Universitas Ahmad Dalan, Indonesia)

Abstract: The proliferation of digital technology in the educational sphere during and after the COVID-19 epidemic has substantially influenced education, particularly teachers in Indonesia. This study, therefore, aims to detect and assess the occurrence of digital burnout among teachers in Muhammadiyah Junior High Schools in Yogyakarta. This study employed utilizing a qualitative method. Data were gathered through in-depth interviews with teachers who experienced symptoms of digital burnout, and observations were made of their teaching practices. The study findings suggest that the use of digital habits, excessive use of technology, and the demands of adapting to new digital platforms are the primary factors contributing to digital burnout in teachers. In addition, this study revealed that digital burnout adversely affects teachers' physical well-being, instructional efficacy, and mental well-being.

09:36 am: *Rasch Analysis of Pre-Service Teachers' Competency Assessment in Technology for Teaching and Learning: Implications for Mathematics Instruction*

Eubert R. Tagupa (Caraga State University, Philippines); Alvic A Arnado (Caraga State University, Philippines)

Abstract: This study utilized the Rasch model, a form of item response theory (IRT), to evaluate the implications for mathematics instruction, problem difficulty, and test reliability in assessing the technological teaching and learning abilities of pre-service teachers (PST) majoring in Mathematics. Data from 50 tests administered to 80 PSTs were analyzed using the Jamovi program. The findings revealed a reliability score of 81.7%, indicating significant disparities in PST achievement. The MADaQ3 value of 0.101 suggested a good fit, supported by a statistically significant p-value of 0.001. However, items such as Q28 and Q43 exhibited Outfit values significantly different from 1, indicating potential issues with these items, which may be outliers or not measure the construct consistently with other items. The difficulty analysis showed a wide range of problem difficulties, highlighting a noticeable learning gap: PSTs excelled at easier problems but struggled with more complex ones. Wright's map illustrated the relationship between PST performance and problem difficulty, identifying areas needing further attention. This study underscores the effectiveness of the Rasch model in developing robust measurement tools, identifying knowledge gaps, and providing actionable recommendations for curriculum enhancement. The results lay a foundation for future research aimed at leveraging technology to improve teaching and learning outcomes.

09:48 am: *Emergency Sound Classification and Visual Alert System for Enhanced Situational Awareness*

Riza Kamelia (Institut Teknologi Sepuluh Nopember, Indonesia); Hendra Kusuma (Institut Teknologi Sepuluh Nopember, Indonesia)
Abstract: This research introduces an audio classification system designed to enhance situational awareness for individuals with hearing impairments. The system recognizes emergency sounds and presents corresponding visual alerts. Utilizing Google's pre-trained YAMNet model, it accurately identifies crucial sounds such as ambulance, firetruck, and police sirens, as well as railroad crossing and other danger alarms, distinguishing them from typical background noise. The system, deployed on an Intel Core i5 processor with an NVIDIA GeForce RTX 2050 (compute capability 8.6), extracts audio features from sound files and classifies them using a trained model. Each identified sound category triggers a specific visual indicator on a graphical interface. To enhance robustness in noisy environments, a noise reduction preprocessing step is applied, improving classification accuracy. Testing demonstrates a 93.68% accuracy rate in emergency sound detection with an average latency of 2.9ms for sound classification. The simulation latency ranges between 120ms and 200ms. These results highlight the system's potential for real-world applications in public spaces and personal safety devices. This work represents a significant advancement in accessible alert systems, extending situational awareness tools to the hearing-impaired and contributing to broader public safety.

10:00 am: *Load Testing Method for Measure the Capability of MOOC Platform to Handle Massive User*

Andang Saefullah (Universitas Gadjah Mada, Indonesia); Ridi Ferdiana (Universitas Gadjah Mada, Indonesia); Bimo Sunarfri Hantono (Universitas Gadjah Mada, Indonesia)
Abstract: The MOOC platform, which has an open and flexible character, is able to accommodate thousands of users simultaneously at one time. This platform aims to provide information to anyone and anywhere by interacting virtually. However, in reality, if a software or platform is operated with excessive activity or massive increase in user load, this condition can cause performance to decline and have a direct impact on user experience. Performance degradation occurs because the system has a maximum capacity limit. If the maximum limit is exceeded, the system will have difficulty in processing user requests effectively. This study aims to systematically identify and evaluate the capabilities of the MOOC platform system using load testing methods and classification techniques. This test simulates the MOOC platform by increasing user activity, which will be validated with the help of performance metrics such as concurrent users, response time, throughput, latency, and error rate. The results of load testing, starting from a load of 100 users to 1200 users, showed unstable fluctuations at certain load points, with the maximum capacity limit at a load of 300 users, where all modules can function optimally. On the other hand, the load above this number shows unstable fluctuations, indicating that the system is starting to be burdened in handling user activities. The test data was analyzed by applying a percentile-based quantitative analysis technique to group the system performance level into 5 categories, namely Low, Low-Medium, Medium, Medium-High, and High. With a systematic approach, this study successfully identified the maximum capacity limit and performance of the MOOC platform. This confirms that the integration of the load testing method and classification using a percentile-based quantitative technique is effective in evaluating the level of system capability.

10:12 am: *Leveraging Machine Learning for Strategic Business Gains in the Healthcare Sector*

A Sufian (University of Westcliff, USA); SM Rimon (Qatar University, Qatar); Zenith Guria (International American University, USA); Niaz Morshed (International American University, USA); Asif Ahamed (Westcliff University, USA)
Abstract: Healthcare industry is witnessing a significant transformation with the development of machine learning (ML) and machine intelligence. Such technologies bring about improved efficiency, enhance clinical decision support, increase efficiency in the use of resources and promote value-based care. The paper assesses the firm-specific effects of ML transformational changes to be introduced in healthcare systems, particularly looking at predictive analytics, patients' engagement, personalized medicine, and operational costs. A systematic approach based on the sequence of actions: accumulation of data, construction of the model, and assessment of its efficiency explains how ML systems are used in the

provision of medical services as well as organizational financial performance. The debate touches on other issues relating to ethics such as privacy of the data as well as reduction of bias and outlines a framework for the sustainable incorporation of the technologies. Suggestions are given to health organizations, policymakers, and stakeholders interested in the application of ML for competitive leverage.

10:24 am: *Transforming AI and Quantum Computing to Streamline Business Supply Chains in Aerospace and Education*

Zenith Guria (International American University, USA); Niaz Morshed (International American University, USA); A Sufian (University of Westcliff, USA); Asif Ahamed (Westcliff University, USA); SM Rimon (Qatar University, Qatar)

Abstract: The article analyzes the effects of Artificial Intelligence (AI) and Quantum Computing in improving the business supply chain systems in the aerospace and education industries. With the increase of technology within various industries, it becomes evident that AI and Quantum Computing are complementing advances in logistics in a bid to bring down the cost of operations and to enhance efficiency in the management of the supply chain. The aerospace sector, predictive maintenance, decision support systems and improved resource allocation are examples of what these technologies make possible. In the education sector, individual students can move through the curriculum at their own pace, the curriculum can be modified based on Big Data of student performance and educational resources can be better distributed. The current paper looks at how AI and Quantum Computing as new technologies are fused together in order to enhance creativity and revolutionize agility to adapt to changes in the environment and consequently the business models of the firms involved here. These developments do not only improve productivity but also pave ways for the two industries to engage in new forms of inter-discipline collaborations leading to progress in both sectors.

10:36 am: *Comparative Study of AI-Driven Ed-Tech Applications: Insights From Google Play Store Data*

Ranita Ganguly (Delaware State University, USA); Nagaraju Dasari (Navy Federal Credit Union, USA)

Abstract: The rapid growth of educational technology (Ed-Tech) has revolutionized how students, teachers, and learners engage in content. As Ed-Tech apps proliferate, understanding their market performance becomes crucial for developers, educators, and stakeholders in the education sector. Mobile applications in the education industry, particularly AI enabled Ed-Tech apps, have experienced tremendous growth and have completely revolutionized learning methods and accessibility. In the current study, we aimed to perform a comparative analysis of Ed-Tech mobile applications using Google Play Store data based on key performance indicators (KPIs), such as the number of downloads, ratings, and user reviews. This study analyzes the market trend of AI enabled Ed-Tech mobile apps using features such as download volume, ratings, and review counts, last updated, and download size. By comparing these parameters, we aimed to discover trends influencing app popularity to user satisfaction and user engagement in the Ed- Tech sector. Our results suggest that AI powered educational apps have more downloads and more reviews; however, a large volume of reviews does not always produce higher ratings. These findings provide useful insights for developers and users seeking to evaluate the quality of Ed-Tech apps.

10:48 am: *Enhancing Contextual Understanding in Chatbots and NLP*

Jamshaid Iqbal Janjua (University of Engineering & Technology, Lahore, Pakistan)

Abstract: This study delves into the progress made in enhancing contextual understanding in chatbots and Natural Language Processing (NLP) systems. The ability of chatbots to comprehend and respond contextually to user inputs is crucial in creating more human-like and effective conversational agents. This paper reviews the existing approaches,

challenges, and recent breakthroughs in the field, offering insights into the methodologies employed to improve contextual understanding. Additionally, it discusses potential applications, ethical considerations, and future directions for research in this evolving domain. The rapid evolution of chatbots and Natural Language Processing (NLP) systems has transformed human-computer interactions, yet challenges persist in achieving robust contextual understanding.

ICTeD 2024: 2024 International Conference on TVET Excellence & Development (ICTeD)

Day 2 Parallel Session 3 (On-Site/Hybrid: Malaysian Time (GMT+8))

Session time	Tuesday, 09:00 am until 11:00 am
Location	Online Room 4 (https://bit.ly/ICTeD2024DAY2_C)
Talk time	12
Chaired by	Ahmad Fadzli Nizam Abdul Rahman (Universiti Teknikal Malaysia Melaka & OptiMAS Research Lab, Malaysia)

09:00 am: *Boosting Physics Engagement in the Philippine Countryside: the Impact of Digital Modules on Understanding of Projectile Motion*

Alvie Jean Gayda Rebuera (Caraga State University, Philippines); Edwin James B. Andoy (Hanoi Academy International Bilingual School, Philippines)

Abstract: In the Philippines, various challenges often lead some students to drop out of school. To help address this, teachers make a concerted effort to support students at risk by providing them with learning modules. These modules enable students to keep up with lessons despite any obstacles they face, offering them an opportunity to continue their education and stay engaged with their studies. However, students have trouble in understanding printed modules during distance learning resulting to conceptual misconceptions on certain critical physics topic such as projectile motion. Thus, the study wanted to develop and evaluate the effectiveness of interactive electronic learning material in teaching projectile motion. The printed learning materials used by the Department of Education were restructured into digital modules to enhance interaction and engagement. Grounded in the theories of distributed cognition, technology acceptance, and independent learning, the study employed a quasi-experimental design to assess the impact of these modules on Grade 9 students' performance and attitudes in projectile motion. The results showed that students using the digital modules performed better and had a more positive attitude compared to those using printed materials, with students expressing satisfaction with the module's interface and ease of use.

09:12 am: *Enhancing Production Capacity With Overall Equipment Effectiveness in Manufacturing Industry*

Amir Hamzah Abdul Rasib (Universiti Teknikal Malaysia Melaka, Malaysia); Fadhli Ariffin Mohd Shablee (UTeM, Malaysia); Hambali Boejang (UTeM, Malaysia); Zubaidi Faiesal Mohd Rafaai (Uniten, Malaysia)

Abstract: This study investigates the role of Overall Equipment Effectiveness (OEE) in enhancing the efficiency and reliability of manufacturing equipment. It aims to quantify equipment performance through availability, performance, and quality metrics to achieve world-class OEE rates. The research focuses on three objectives: identifying the six significant loss factors in manufacturing, applying OEE measures in production assembly, and proposing strategies to improve production capacity based on OEE findings. Utilizing data collection and analysis techniques such as Why-Why Analysis, Cause and Effect Diagrams, and Six Big Losses analysis, the study highlights the importance of OEE in optimizing the Automated Production Line (APL5) in the automotive industry. The findings suggest that implementing OEE can effectively address the six big losses, thereby enhancing production capacity and operational performance.

09:24 am: *The Research Landscape and Emerging Trends in Technical and Vocational Education and Training for Sustainability (1998 - 2023)*

David Kongpiwatana Narong (Mahidol University, Thailand & California Institute of Advanced Management, USA)

Abstract: Research on sustainability within technical and vocational education and training has grown in recent years, yet a comprehensive review of the literature remains lacking. This systematic review fills this gap by using bibliometric methods to analyze 170 Scopus-indexed documents, establishing empirical benchmarks and revealing insights into the field's growth and thematic development. The findings suggest that this area is still significantly underexplored and would benefit from enhanced international collaboration. This study highlights key scholars and influential publications that serve as foundational resources to support future research and practical applications. Major areas of scholarly interest include engineering and teacher education, along with the integration of economic and environmental dimensions. Emerging research fronts suggest a growing intersection between technological advancements and sustainability in this field. Additionally, trends show an increasing diversity in educational disciplines and research methodologies, inspiring new research directions and providing valuable perspectives for those aiming to position their work within the broader dialogue on sustainable education.

09:36 am: *Service Learning Practices in Community Lab: A Study in Malaysian Institutions of Higher Learning*

Mahyuddin Arsat (Universiti Teknologi Malaysia, Malaysia); Yushaireen Syafiqa Yusof (Universiti Technologi Malaysia, Malaysia); Nornazira Suhairom (Universiti Teknologi Malaysia, Malaysia); Nur Husna Abd Wahid (Universiti Teknologi Malaysia, Malaysia); Ahmad Nabil Md Nasir (Universiti Teknologi Malaysia, Malaysia); Muhammad Khair Noordin (Universiti Teknologi Malaysia & Faculty Of Education, Malaysia); Sharifah Maryam Syed Azman (Universiti Teknologi Malaysia, Malaysia)

Abstract: The community lab is considered an instrument where participants, resources, and activities enable innovation at all phases of the life cycle, and all members collaborate in the creation, prototyping, validation, and testing of a project or product in a real-life context. Service-learning practices in the community lab refer to service-learning content, service-learning management, collaboration with the community and stakeholders, and student engagement in service-learning within the community lab. In order to identify the key practices carried out by the lecturers and course instructor in implementing service learning in the community lab, a mixed-methods research design was adopted in this study. A descriptive study was conducted through a survey, employed close-ended questionnaires to gather data and analyzed thru the value of frequency, percentages, mean as well as standard deviation. Meanwhile, for the qualitative research approach, semi-structured interviews were employed. The data from both parts of the study were analyzed using descriptive analysis methods and thematic analysis. The findings of the study reveal that a significant majority of lecturers and course instructors reported service-learning practices in community lab, across all element, are at a high level. Additionally, four themes were identified for all these elements. Thus, the practice of service-learning content in community lab

aligns with learning objectives, while service-learning management practices involve the allocation of financial resources. Furthermore, collaborative practices with the community and stakeholders are characterized as open discussions. Finally, the practice of student involvement in service learning focuses on selecting students with strong generic skills.

09:48 am: *Electric Vehicle Charging Infrastructure Regulatory Compliance: TVET Relevance and Recommendations*

Adam Junid (PLUS Berhad, Malaysia); Azalan Sulaiman (PLUS Berhad, Malaysia); Jasmer Sathilan (PLUS Berhad, Malaysia); Rosnizam Zailan (PLUS Berhad, Malaysia); Rizal Ghani (PLUS Berhad, Malaysia); Nazim Hakimi (PLUS Berhad, Malaysia)

Abstract: Regulatory compliance of Electric Vehicle charging infrastructure includes aspects of licensing, registration, safety, fire protection, user payment systems and uptime. Technical Vocational Education and Training (TVET) and its resources play a key role training manpower for effective regulatory governance and compliance of charging infrastructure. This paper compares the EV charging infrastructure regulatory environment in Malaysia with other countries and identifies improvement opportunities where TVET could play key roles for better regulatory practice and more consistent compliance. Recommendations are suggested to improve both regulatory efficacy and TVET syllabi. Though recommendations in this paper were aimed specifically to synergize and advance charging infrastructure regulatory practice together with supporting TVET in Malaysia, the methodology derived in developing the recommendations could apply to other regulated industries elsewhere.

10:00 am: *TVET for All: Fostering Social Equity Through Inclusive Skills Education*

Wai Yie Leong (INTI International University, Malaysia)

Abstract: Technical and Vocational Education and Training (TVET) plays a pivotal role in equipping individuals with the skills necessary to participate in an evolving global economy. However, inequities in access and participation persist, disproportionately affecting marginalized groups such as women, persons with disabilities, and socio-economically disadvantaged communities. This paper examines the transformative potential of inclusive TVET systems in fostering social equity and economic empowerment. Drawing on global case studies and recent research, the study highlights the critical need for policies and practices that prioritize accessibility, equity, and cultural relevance. It explores the integration of assistive technologies, gender-responsive curricula, and community-based partnerships to dismantle barriers and create pathways to meaningful employment. The analysis underscores the importance of aligning TVET initiatives with the principles of social justice, lifelong learning, and the Sustainable Development Goals (SDGs).

10:12 am: *Enhancing Practical Skills Training Through Virtual Reality in TVET Education*

Wai Yie Leong (INTI International University, Malaysia)

Abstract: Technical and Vocational Education and Training (TVET) plays a critical role in equipping learners with practical skills required for the workforce. However, traditional hands-on training in TVET often faces challenges such as high costs, safety risks, and limited access to advanced technologies. Virtual Reality (VR) emerges as a transformative solution, offering immersive and interactive learning environments that replicate real-world scenarios. This paper explores the integration of VR into TVET education, emphasizing its potential to enhance practical skills training. VR simulations provide a risk-free platform for learners to practice technical tasks, enabling repetitive practice and error correction without resource depletion or hazards. The study also examines how VR can address accessibility gaps, democratizing access to high-quality training across geographically dispersed regions. Key benefits, including improved learner engagement, retention, and adaptability to industry demands, are discussed alongside challenges such as cost, infrastructure requirements,

and the need for instructor training. By analyzing case studies and pilot programs, the paper highlights the effectiveness of VR in fostering a skilled and future-ready workforce. The findings underscore the importance of adopting VR as a supplementary tool in TVET education, paving the way for innovative, scalable, and inclusive vocational training solutions.

10:24 am: *Bridging the Gender Gap in Technical and Vocational Education and Training: A Global Comparative Study of Policy, Technology, and Gender Inclusivity*

Roberto Gomez Tobias (Tecnológico de Monterrey, Mexico); Jorge Alvarez (Tecnologico de Monterrey, Mexico); Javier Armando Gonzalez Lozano (Tecnologico de Monterrey, Mexico); Luis Vicente Cabeza Llanos (Tecnologico de Monterrey, Mexico)

Abstract: This study explores gender disparities in Technical and Vocational Education and Training (TVET) programs across Germany, Malaysia, and Mexico. It examines how gender-sensitive policies, technological infrastructure, and emerging technologies like Artificial Intelligence (AI) and Virtual Reality (VR) influence female participation, retention, and completion rates. Employing a mixed-methods approach, the research draws on UNESCO's 2024 Gender Report and a survey of 90 female TVET students to quantitatively analyze the relationship between policy frameworks, technology access, and educational outcomes. The results reveal significant disparities in female completion rates, with Germany and Malaysia achieving 100% completion due to robust policy support and technological integration. In contrast, Mexico exhibits lower rates (60%), primarily influenced by socio-cultural norms and limited digital infrastructure. The study highlights the benefits of AI and VR in creating personalized, immersive learning environments that enhance student engagement. However, it also warns of potential gender biases embedded within AI algorithms, suggesting the need for careful monitoring and ethical considerations. This research contributes to the understanding of how policy and technology interventions can promote gender equity in TVET. The study recommends the development of comprehensive gender-sensitive policies, the expansion of digital infrastructure, and the use of unbiased AI tools to foster inclusive learning environments. It underscores the importance of investing in technological advancements and creating policy frameworks that address both institutional and socio-cultural barriers. Future research should adopt a longitudinal approach to assess the long-term impacts of technology integration and explore strategies to mitigate AI biases in educational settings.

10:36 am: *Implications of Technical and Vocational Education and Training (TVET) on Economic Development and Employment Prospects in Palestine*

Sara Salih Ahmed (University Technical Malaysia Melaka & UTeM, Malaysia); Mahmoud Mohamed Nazzal (University Technical Malaysia Melaka, Palestine); Ahmad Zaki Bin Abu Bakar (Universiti Teknikal Malaysia Melaka & Malaysian National Computer Confederation (MNCC), Malaysia); Datuk Suaidi Dato Safei (Universiti Technical Malaysia Melaka, Malaysia); Ruzy Haryati (Universiti Teknikal Malaysia Melaka, Malaysia); Noorayisahbe Mohd Yaacob (University Kebangsaan Malaysia, Malaysia); Mohammed Doheir (University of Teknikal Malaysia Melaka, Malaysia)

Abstract: This paper aims to explore the vital role of Technical and Vocational Education and Training (TVET) in promoting economic development and enhancing employment prospects in Palestine. Utilizing a descriptive analytical approach to enable the analysis of the existing position of TVET in Palestine and to study the main necessities for its development to further prep for the job market armed with the knowledge needed. Secondary sources were used in the research, represented by books, scientific journals, publications, reports, and periodic statistics. The research evaluates how TVET programs can bridge the gap between education and labor market demands. The study draws comparisons from successful international models like Germany, Malaysia, and China, highlighting how Palestine can adapt these frameworks to its unique socio-economic environment. The research suggests that TVET is a crucial driver in reducing unemployment, fostering economic growth, and equipping the Palestinian workforce with the competencies and capabilities needed to flourish in a modern economy.

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End of Session

Session time	Tuesday, 11:30 am until 12:00 pm
Location	