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MyRIVET
MALAYSIA RESEARCH INSTITUTE FOR VOCATIONAL EDUCATION & TRAINING

TVET PROSPECT

VOLUME I
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Director's Note

The Malaysian Research Institute for Vocational Education and Training (MyRIVET) wishes to reintroduce its quarterly bulletin, previously tagged "TVET Vision" and now "TVET Prospect", which was first published in 2020. TVET Prospect disseminates information regarding MyRIVET's training, research activities and collaboration and aims to establish local and international networks and partnerships.

MyRIVET's core mission borders on mainstreaming and empowering TVET systems through research, education, consultation, training, and collaboration with stakeholders to generate dynamic talent. Crucial to achieving this mission, MyRIVET engages in innovative and timely research in TVET that impacts TVET systems. It is, therefore, pertinent to discuss the significance of research in TVET to human development and the world we currently live in.

Technical and Vocational Education and Training (TVET) has gained increasing significance in our world, as it provides an avenue for individuals to develop practical skills and knowledge in high demand in the job market. TVET research plays a crucial role in advancing the field and improving the quality of education and training provided to students.

First, TVET research helps to address the skills gap that exists in many industries. In today's rapidly changing world, new technologies and advancements in diverse fields are constantly emerging, requiring workers to possess specialised skills and knowledge. TVET research can help identify the most in-demand skills in various occupations and inform the development of educational programs that align with the needs of employers and workers. This can lead to improved job prospects for individuals and increased competitiveness for nations alike.

Second, TVET research can help to bridge the gap between education and employment by ensuring that educational programs prepare individuals with requisite skills for the job market. TVET research can identify the skills and competencies needed for various occupations and provide guidance for TVET institutions to teach these skills effectively. This helps ensure that students are equipped with the skills and knowledge employers seek. It also increases their chances of finding employment after graduation or developing entrepreneurial startups where they can apply such skills to earn a living.

Third, TVET research can contribute to developing more effective and efficient training methods and materials. This can lead to improved quality of education and training and help to enhance the overall effectiveness of TVET programs. For example, research can inform the development of online learning platforms, virtual and augmented reality training simulations, and other innovative approaches to provide students with hands-on experience in various fields.

Finally, TVET research can help to improve access to education and training for individuals from disadvantaged backgrounds. TVET education and training are often viewed as a means of providing individuals with an alternative path to employment and financial stability. However, many individuals from disadvantaged backgrounds, such as low-income families, rural communities, and marginalised groups, face barriers to accessing TVET education and training. TVET research can help identify these barriers and provide solutions to address them, such as the development of distance learning programs or the provision of financial assistance to low-income families.

In conclusion, it is evident that TVET research plays a crucial role in improving human development and the world we currently live in. It helps to address the skills gap in various industries, bridge the education-to-employment gap, contribute to the development of more effective training methods and materials, and improve access to education and training for disadvantaged individuals. Investing in TVET research can help to enhance the quality of education and training and improve the prospects and livelihoods of individuals, communities, and countries. Therefore, it is the responsibility of TVET stakeholders to continue to pioneer and shape TVET research such that it continues to address the current skills needs across various vocations and occupations. MyRIVET is committed to this goal. Hence, in the following segments of this volume of TVET Prospect, we highlight some of the strides in research, training and development, as well as initiatives in fostering collaboration and partnership with local and international TVET stakeholders and institutions that we have made.

Professor Emeritus Jailani Md Yunos
Director,
Malaysian Research Institute for Vocational Education & Training

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Virtual Meeting Between the Colombo Staff College (CPSC) and the Malaysian Institute for Vocational Education and Training (MYRIVET)

September 13th, 2022

On the 13th of September 2022, a virtual meeting was held between the Colombo Staff College (CPSC) and the Malaysian Research Institute for Vocational Education and Training (MyRIVET). The meeting was held to discuss and strengthen cooperation for training programs between the two institutes. The meeting was attended by the DG of CPSC, Prof G.L.D Wickramasinghe, the Chairman of the Training, Development & Research Division, Dr Kesavan Ulaganathen, the Chairman- ICT General Services Dr Mian Khuram Ahsan, the Projects & Consulting Officer, Ms. Arlene Cruz, the Research, Publications and Information Division (RPID) officer- Mr. Rae Echaveria and the Executive Secretary, Mr. Jan Michael Marasigan. MyRIVET was duly represented by its Director, Prof. Emeritus Dr. Jailani bin Md Yunos, Deputy Director, Assoc. Prof. Ts. Dr Lai Chee Sern, the Head of Global Cooperation Department, Assoc. Prof Ts. Dr Tee Tze Kiong and Administrative Assistant, Ms Nur Ellina binti Irfangi.

Pre-Meeting on the Readiness of TVET Institutions for the Fourth Industrial Revolution (IR 4.0) in Southeast Asia

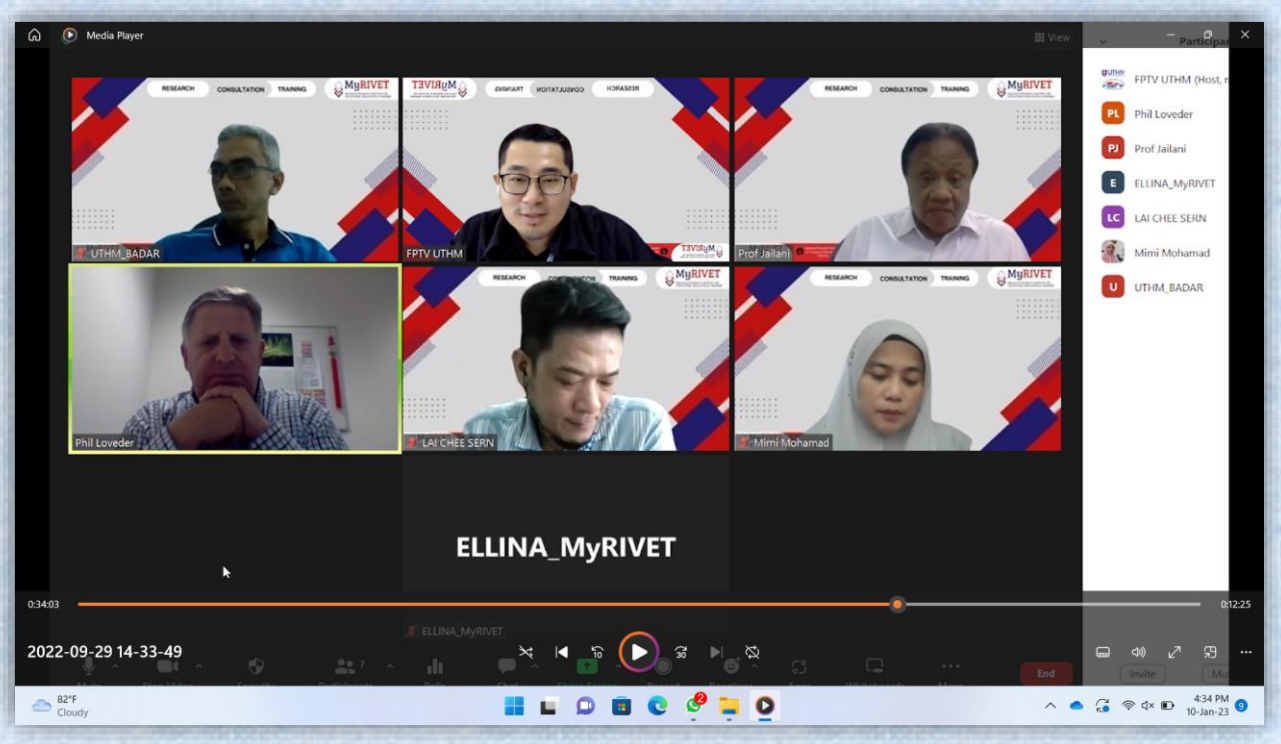
September 20th, 2022

MyRIVET facilitated a regional training workshop/meeting on the 20th of September 2022 to discuss the readiness of TVET institutions for IR 4.0 in Southeast Asia. The meeting was attended by as many as 18 participants from 7 countries-- Brunei Darussalam, Cambodia, Lao PDR, Thailand, Vietnam, Indonesia and Malaysia. The meeting was held online using the Zoom Meeting app. Participants from Brunei Darussalam were represented by Dr Adeline Goh Yuan Sze, Dr Kabiru Maitama Kura, Ms. Rahimah Mohiddin, Dr Saiful Rizal and Dr Tang Shi Siong. Mr Tim Vorn represented Cambodia, and Lao PDR was represented by Mr. Khamdy Bouthakhanh. Thailand was represented by Mr. Arnon Niyomphol, and Vietnam was represented y Mr Phong Nghia Hoang. Participants from Indonesia were represented by Mr Dona Octanary, Dr. Moch Bruri Triyono, Dr Didik Nurhadi, Mrs. Yuni Rahmawati and MMrMuhammad Aris Ichwanto, Mr. Mohammad Musthofa Al Ansyorie. Participants from Malaysia were represented by Assoc. Prof. Ts. Dr Mimi Mohaffyza, Ts. Dr Tee Tze Kiong and Mr. Baharulnizam

bin Baharum. The meeting was successful as critical issues on the foundation of the research activity were proposed and discussed.

Collaboration Meeting between the Malaysian Research Institute for Vocational Education & Training (MyRIVET) and National Centre for Vocational Education Research (NCVER)

September 29th, 2022

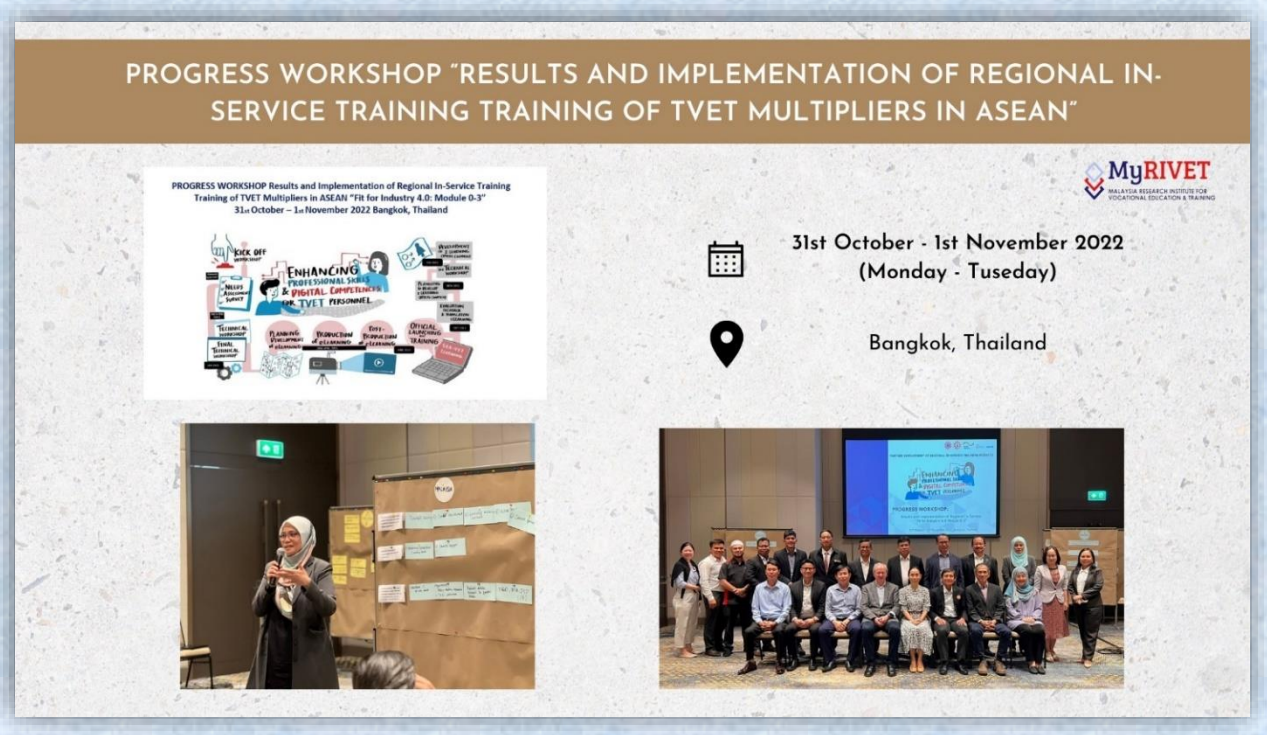


A virtual meeting was held between the Malaysia Research Institute for Vocational Education and Training (MyRIVET) and the National Centre for Vocational Education Research (NCVER) on 29 September 2022 between 2:30 pm and 3:30 pm via Zoom Meeting platform. The online meeting was attended by the MyRIVET director, Prof. Emeritus Dr. Jailani bin Md Yunos, deputy director, Assoc. Prof. Ts. Dr. Lai Chee Sern, Head of Global Cooperation Department, Ts. Dr Tee Tze Kiong, Head of Research Innovation & Consultancy Department, Associate Prof. Ts. Dr Badaruddin Bin Ibrahim, Head of Training & Career Development Department, Associate Prof. Ts. Dr Mimi Mohaffyza Binti Mohamad and Executive Group Manager, Inform and Engage; Director, International UNESCO-UNEVOC Regional Coordinator, National Centre for Vocational Education Research (NCVER), Mr Phil Loveder. Both institutes share their portfolio through presentations. The National Centre for Vocational Education Research (NCVER) is the national professional body responsible for collecting, managing, analysing and communicating research and statistics on the Australian vocational education and training (VET) sector. MyRIVET performs a similar role by engaging in activities such as undertaking strategic programs for education and training research, collecting and publishing research findings, disseminating

the results of integrated research and data analytics, and building links with similar international organisations. NCVER welcomes MyRIVET to have further discussions on future collaboration.

Progress Workshop: "Results and Implementation of Regional In-service Training of TVET Multipliers in ASEAN

October 31st – November 1st, 2022



A Progress workshop on the theme "Results and Implementation of Regional In-Service Training of TVET Multipliers in ASEAN" held from the 31st of October to the 1st of November 2022, in Bangkok, Thailand, was organised by the Regional Cooperation Programme for TVET in ASEAN (RECOTVET). The workshop had in attendance representatives from TVET training institutions from ASEAN countries. The key focus of the workshop was to report on the progress made by member ASEAN countries on the capacity building of national TVET education based on Regional In-Service Training Modules. Specifically, the workshop discussed the best practice and approaches for TVET educators' professional development in the national training programs. One key recommendation proposed was that ASEAN member countries introduce the concept of future training courses for specific needs and demands from TVET institutions. MyRIVET was represented by the Head of Department: Training and Career Development, Assoc. Prof Ts Dr Mimi Mohaffyza Mohamad.

Research Collaboration between the Malang State University, Indonesia and the Malaysian Research Institute for Vocational Education & Training (MyRIVET)

November 2nd, 2022

A joint research discussion was held between MyRIVET and Malang State University, Indonesia, on the 2nd of November 2022. The discussion was held online via the Zoom Meeting platform. The discussion was attended by Prof. Dr. Eddy Sutadji, Andika Bagus Nur Rahma P., Azhar Ahmad Smaragdina, Muhamad Nidhom and Yogi Mahandi from Malang State University of Indonesia and Prof. Emeritus Dr. Jailani bin Md Yunos, Assoc. Prof. Ts. Dr. Badaruddin bin Ibrahim, Ts. Dr. Tee Tze Kiong, Ts. Dr. Yee Mei Heong and Cik Nur Ellina binti Irfangi. During the discussions three potential topic areas for collaboration were discussed. These include virtual learning, smart expert system and community service. Both parties will continue their extended work to apply for research grants offered by the Indonesian government

SEAMEO VOCTECH Workshop on Research Readiness of TVET Institutions for IR 4.0 in Southeast Asia

November 7th -November 10th, 2022

MyRIVET in collaboration with ASEAN countries participated in the SEAMEO VOCTECH workshop held in Brunei Darussalam to access the readiness of TVWET Institutions for IR 4.0 in Southeast Asia

Assoc.Prof Ts Dr Mimi Mohaffyza Mohamad and Assoc.Prof Ts Dr Tee Tze Kiong represented MyRIVET in the workshop. The project is carried out in two-phases; the first phase assesses the readiness of TVET Institutions for IR 4.0, while the second phase seek to solicit feedback and recommendations from TVET institutions and industry leaders on future adoption and development of IR4.0 among Southeast Asian countries. At the end of the workshop, members finalised the research framework and developed relevant instrument and questionnaire for the study. Also, action plans on the implementing the proposed project in member countries were discussed. The role of

MyRIVET is to obtain data from TVET institutions and industries in Malaysia in line with the focus of the study. The results of this project will give insights into the level of readiness of TVET institutions in Malaysia to face challenges in terms of TVET curriculum, facilities, management, and technology for IR4.0.

Courtesy Visit to The National Institute of Ethnic Studies (N-KITA)

November 30th, 2022

MyRIVET paid a courtesy visit to the National Institute of Ethnic Studies (n-KITA) on the 30th of November 2022. The Director of n-KITA, Prof. Ulung Datuk Dr. Shamsul Amri Baharuddin, spent time with the MyRIVET delegation, consisting of the Director, Prof. Emeritus Dr Jailani Md Yunos and Deputy Director, Assoc. Prof. Ts Dr Lai Chee Sern, to discuss strategies and initiatives to strengthen MyRIVET's role as a TVET institution that contributes to the empowerment of the nation's TVET. During the discussions, Prof Ulung Datuk Dr Shamsul emphasised strategies in the aspects of Public Advocacy, Professional Engagement, and Branding & Visibility. The discussion was also attended by the deputy director of n-KITA, Prof Dr Kartini Aboo Talib@Khalid, Head of Quality Assurance Department, Dr Shazlin Amir Hamzah, Senior Researcher, Assoc. Prof. Ts Dr Mohd Sobhi Ishak and Chief Assistant Registrar, En Mohd Faris Ngadinin@Adinin. In addition, Prof Ulung Datuk Dr Shamsul also welcomed the collaboration between n-KITA and MyRIVET in the field of TVET for the development of the country.

Work Visit to EduCity Iskandar

December 5th, 20222

MyRIVET led a delegation to EduCity Iskandar on the 5th of December 2022. The visit was aimed at fottering more collaboration and partnership with key stakeholders in Malaysia.

In attendance for the meeting was MyRIVET Director, Prof. Emeritus Dr Jailani Md Yunos, Prof. Dr Sakina Sofia Baharom, Director of Operations, EduCity Iskandar Malaysia, and Mrs. Faridah Ismail, Vice President (Education) EduCity Iskandar Malaysia. The discussion highlighted the role that EduCity Iskandar can play in contributing towards economic development in Malaysia and Johor State in particular. As a result of this discussion, MyRIVET can also contribute to the focus of TVET development from the aspect of research, development of TVET framework, concept of content of TVET program relevant to industry needs and consulting services. EduCity Iskandar welcomes the

cooperation of MyRIVET and MTUN specially to consolidate expertise towards the development of TVET in Johor State.

Round Table Discussion by the National Professor Council (MPN) Malaysia on TVET Empowerment in Malaysia

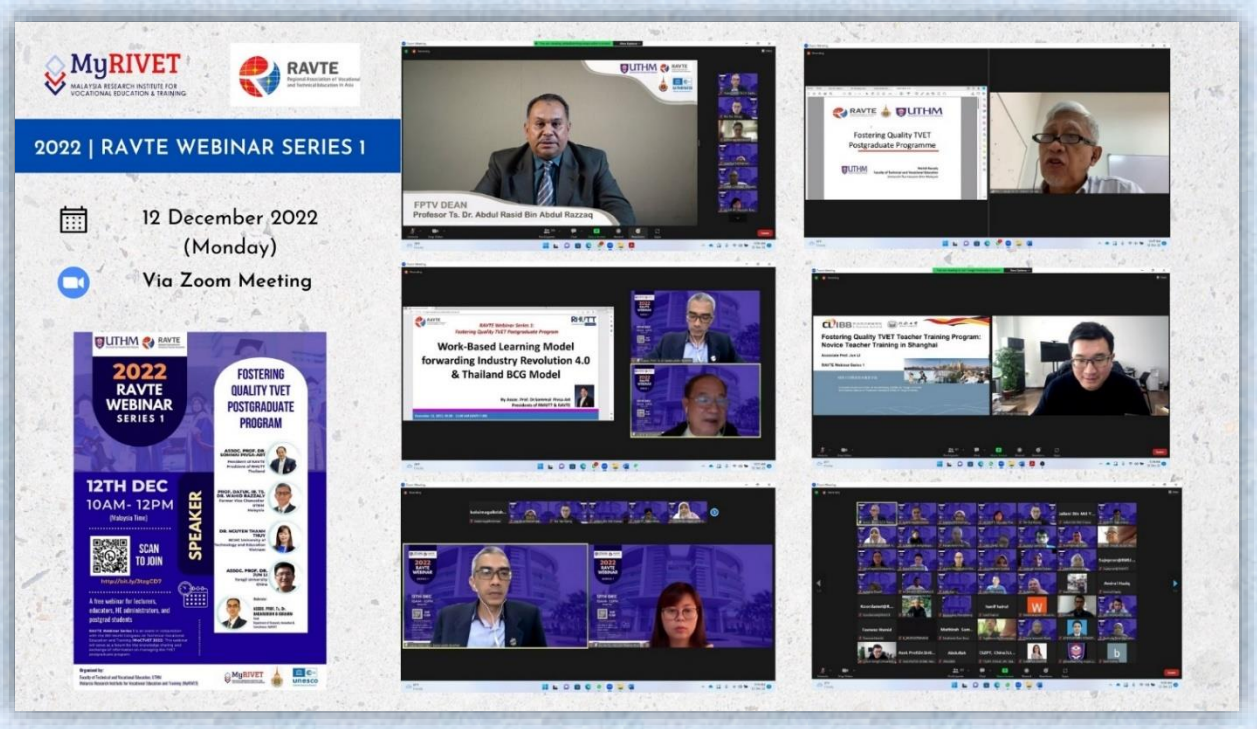
December 7th, 2022

The third Round Table (RTD) Discussion on TVET Empowerment in Malaysia organized by the National Professor Council (MPN), Malaysia was held on December 7, 2022, at Bangi Resort Hotel. MyRIVET was duly represented by the Director, Prof. Emeritus Dr Jailani Md. Yunos. The discussion focuses on the direction, issues and challenges of TVET in Malaysia and the role of MyRIVET & MPN in contributing towards the quality of the country's TVET.

RAVTE Webinar Series: Fostering Quality TVET Postgraduate Program

December 12th, 2022

On the 12th of December 2022, RAVTE Webinar series was held with the theme "Fostering Quality TVET Postgraduate Program". The event was held in conjunction with the 8th World Congress on Technical Vocational Education and Training (WoCTVET 2022). This webinar focuses on sharing and exchanging information on managing TVET postgraduate programs. The goal was to share current good practices that can benefit higher education institutions currently offering TVET postgraduate programs around the world. Four distinguished speakers were invited to deliver their speech. The speakers are (1) Assoc. Prof. Dr. Sommai PIVSA-ART, Presidents of RAVTE & Raja Manggala University of Technology Thanyaburi, RMUTT. He spoke on the theme- Work-Based Learning Model forwarding Industry Revolution 4.0 & Thailand BCG Model, (2) Professor Emeritus Datuk Ir. Ts. Dr. Wahid bin Razzaly, the former Vice Chancellor-Universiti Tun Hussein Onn Malaysia, Malaysia. He spoke about- Fostering Quality TVET Postgraduate Programme, (3) Dr. Nguyen Thanh Thuy, HCMC University Technology and Education spoke about Vietnam: Industry's Transformation and Contributions of TVET Providers in Vietnam and lastly, (4) Assoc. Prof. Dr. Jun Li, Tongji University, China: spoke about- Fostering Quality TVET Teacher Training Program: Novice Teacher Training in Shanghai. The webinar was moderated by Assoc. Prof. Ts. Dr. Badaruddin B. Ibrahim and about 200 participants joined the webinar.



The 8th World Conference on Technical and Vocational Education and Training

December 13th – December 14th, 2022

The 8th World conference on Technical and Vocational Education and Training was organized by the Faculty of Technical and Vocational Education, Universiti Tun Hussein Onn Malaysia and the Malaysia Research Institute for Vocational Education and Training and featured the theme- "Resilient TVET in VUCA World: Towards the Needs of Global Development."

Day 1 of the conference featured a keynote address on the theme "Strategic Leadership through Industry-Institutions Partnership in VUCA World" by Assoc. Prof. Ts. Dr. Afferro bin Ismail, the Coordinator, UN EVOC Centre, and Head of Centre of Industry (UTHM-Labtech Digital Innovation Centre), Faculty of Technical and Vocational Education, UTHM. In his keynote address, Assoc. Prof. Ts. Dr. Afferro bin Ismail highlights the meaning of VUCA, which stands for Volatile, Uncertain, Complex and Ambiguous and discusses what leadership in VUCA world entails.

Day 1 of the 8th WoCTVET 2022 also featured forum discussions consisting of three panel speakers. Panel 1 was the Chief Executive Officer of FIC Integrated, Property Management Sdn.Bhd- Ts. Mohd Fadzli Mohd Idris, Panel 2 was the Deputy Director, SEAMEO VOCTECH Brunei Darussalam, Dr Paryono Paryono and Panel 3 was a Research Fellow from the Korea Research Institute for Vocational Education and Training (KRIVET)- Dr Kim Young Saing. The Video for Day one of the conference can be found at https://www.youtube.com/watch?v=IHH_DrX0xnQ.

Day 2 of the 8th WoCTVET 2022 also featured a keynote address on the theme "Empowering Women TVET Educators Competency in VUCA World by Assoc. Prof. Dr. Margarita Pavlova, Director UNEVOC Centre, The Education University, Hong Kong. Assoc. Prof. Dr. Margarita Pavlova discussed the paradigm shift towards a green economy and the VUCA world, why it is essential for TVET to respond to the VUCA World and TVET solutions for the VUCA world -Green Resilience.

Day 2 of the 8th WoCTVET 2022 also features a forum discussion consisting of three panel speakers namely, Panel 1: Ts Dr Yusmarwati Yusof, Senior Lecturer, Faculty of Technical and Voactional Education UTHM, Panel 2: Dr Youngah Kang, Lecturer, Korea Polytechnic (KOPO) and Panel 3: Associate Prof. Dr Ana, Universitas Pendidikan Indonesia (UPI. Details of day 2 of the conference can be accessed via https://www.youtube.com/watch?v=bUaLdy82ZlY.

Ongoing Research Projects Featuring MyRIVET Researchers

ProWoThai Project

The ProWoThai Project, funded by Federal Ministry of Education and Research (BMBF) of Germany, is led by Prof Dr Thomas Schroeder of TU Dortmund and partnered with UTHM and several universities from Thailand, such as Rajamangala University of Technology Lanna (RMUTL), Rajamangala University of Technology Thanyaburi (RMUTT) and King Mongkut University of Technology North Bangkok (KMUTNB). The overall goal of the ProWoThai project is to explore current and innovative approaches of work-based learning in Thailand. Specifically, the project aims to achieve the following objectives:

i. Analysis and comparison of existing approaches to work-based learning in Thailand and Germany

ii. Implementation of work-related forms of learning at different learning venues (school, training centres, companies)
iii. Development of teaching / learning materials and implementation of training courses
iv. Development of research-based recommendations to improve vocational training in Thailand.
v. Scientific coaching in the context of workshops with partner universities in Thailand.

For more information, please contact Prof Dr Jailani Md Yuns via jailani@uthm.edu.my

Upskilling and Reskilling Framework for Ageing Workers in the Era of IR 4.0

There are two factors revolutionizing the industrial landscape in Malaysia. One is the advent of IR 4.0 requiring industrial workers to possess new skillset. And the other is that MALAYSIA is officially considered an ageing country because in 2022, the populace aged 65 years and above is over 7% of the national population. Based on the definition proposed by the United Nation, an ageing country is where the number of people aged 65 years old and above is 7% of the total population. To deal with these challenges, a research project is conducted to develop a new reskilling and upskilling framework targeted at ageing workers to enable them to adapt to new working environment within IR 4.0. This three-year project is funded by UTHM and led by Assoc. Prof Dr Lai Chee Sern.

For more information, please contact Assoc. Prof Dr Lai Chee Sern via lcsern@uthm.edu.my.

Digital Module of Inventive Problem-Solving Skills in Project-Based Learning for Design and Technology Subjects Towards Achieving Edu. 4.0

Inventive problem-solving skills (IPSS) are a critical element in Education 4.0. to produce creative and innovative human capital that meet the needs of Industrial Revolution 4.0. Currently, Design and Technology (RBT) subject places special emphasis on the production of products which require problem-solving skills. Past studies related to problem solving skills show that the level of preparation, knowledge and involvement of the school, teachers and students is still not at an encouraging level. Project-based learning (PBL) is a platform in RBT subjects aimed at applying KPMI which aims to focus on problem solving and produce technological products. However, the challenge is that student mastery in PBL is still low because students find it difficult to produce creative ideas in product production. Similarly, teachers not skilled in applying PBL in teaching as well as issues surrounding the time constraints in implementing PBL. As a result, students are unable to create products that can effectively solve life's problems, thus contradicting the requirements of Edu 4.0. Therefore, a proposed solution to the problem is by developing a teaching module for the integration of KPMI in PBL for RBT subjects. Therefore, this study was designed to achieve this goal. The study is carried out in two phases, (i) case studies using a qualitative approach and (ii) module development.

Phase 1 will utilise interview, observation and documentation collection methods involving 30 students and 15 form 2 teachers in secondary schools in Batu Pahat district, Johor. The thematic method is used to extract the main themes covering the teacher's teaching strategies and activities as well as the students' level of mastery of KPMI and PBP. Subsequently, a digital module integrating KPMI and PBP was developed based on the Meyer Model. This module can be a guide for RBT teachers for creating effective learning as well as increasing student mastery in the production of technological products. Specifically, this project aims to achieve the following objectives:

i. How can the mastery of secondary school students in project-based learning for RBT subjects be increased to meet the requirements of Edu 4.0?
ii. What specific elements are required in the integration of inventive problem-solving skills in project-based learning for RBT subjects?
iii. What suggestions are effective in helping to improve student mastery in project-based learning for RBT subjects towards achieving Edu 4.0.?

For more information about the project, please contact Assoc. Prof. Ts. Dr. Tee Tze Kiong via tktee@uthm.edu.my

Heutagogical approach and thinking skills in TVET.

Combining heutagogy and thinking skills is very important to ensure that TVET graduates can meet the IR4.0 skillset required for future jobs. Thinking skills are the ability to use the mind through cognitive and metacognitive processes to find meaning and understanding of something, make judgments and decisions, or solve problems. The skill of working in a group entails cooperation which also requires a combination of mental, physical, and emotional strength that determine the success of an organization. Through this cooperation, each group member will interact closely, share information, make decisions, and be responsible for executing the assigned tasks. The determination of independent learning or heutagogy will give students freedom in learning, and the integration of thinking skills will prepare students to be able to face challenges later in real work. Therefore, this study is conducted to produce a framework for the heutagogical approach and thinking skills for TVET students reflecting the objectives of the study. through the design of a survey study with a quantitative approach. The study results are expected to contribute to a more focused and flexible teaching and learning methodology in TVET.

For more information about the project, please contact Assoc Prof Ts. Dr. Mimi Mohaffyza Mohamad via mimi@uthm.edu.my

A Framework for Integrating Thinking Skills and Inventive Problem Solving through Heutagogy, Peeragogy, and Cybergogy Towards TVET Graduate Employability

The importance of integrating thinking skills and inventive problem-solving skills through the learning approach of heutagogy, peeragogy and cybergogy to TVET graduates is to provide them with complete generic job skills profile to support the technical and vocational skills they have acquired in their respective fields of study. This research aims to develop a framework of thinking skills (TS) integration and inventive problem-solving based on TRIZ process through the component pedagogical approach applied in TVET. The study will explore each element of heutagogy, peeragogy and cybergogy towards the ability of situation-based problem-solving skills in the industry, and elements of TS and TRIZ. This research will utilize a mixed-method research design and the respondents of the study are Vocational Colleges students in Malaysia. A framework will be proposed for TVET innovative teaching and learning approach towards industrial practice as preparation for TVET graduates facing challenges and job marketability. A digital template will be produced based on the proposed framework to carry out case-based workplace learning activities, and the evaluation of its effectiveness will be carried out in the next phase of the project.

For more information about the project, please contact Assoc Prof Ts. Dr. Mimi Mohaffyza Mohamad via mimi@uthm.edu.my

Development of a New Asnaf-Prenuer Model through Skill Training Based on a Transformative and Facilitative Approach towards the Socio-Economic Improvement of the Asnaf Group

Among the goals of the 12th Malaysian Plan (2021-2025) is to eradicate extreme poverty in the B40 group. The B40 group involved is Asnaf who receives zakat assistance in each state. Implementing the Asnaf Development Program in the form of entrepreneurship and skills development by the Majlis Agama Islam Negeri (MAIN) is aimed at encouraging Asnaf to generate the family economy. The impact of the acquired skills training should be the starting point for Asnaf to be more independent, knowledgeable, and skilful such that the impact can be beneficial to the Asnaf community. A single case study will be conducted with information on the training program provided by MAIJ from the Asnaf group, the type of program, certification, and assistance provided. In-depth exploration methods need to be conducted to the instructors of these skills training to identify the extent to which the Asnaf group's involvement and commitment follow exercise. In-depth exploration will be conducted by interviewing teaching staff, training providers, MAIJ and training participants to obtain detailed information based on the concept of transformative learning which underlies the study. An analysis based on the theme will be made, and the study's conclusion will produce a conceptual approach to skill training based on transformative learning, which is expected to have added elements to make it clearer to the actual practice in accordance with the Asnaf group.

For more information about the project, please contact Assoc Prof Ts. Dr. Mimi Mohaffyza Mohamad via mimi@uthm.edu.myResearcher's Perspectives

Public and Private TVET Education: Return on Investment (ROI) as a Monitoring Tool for Funding

The government has allocated substantial budgets of RM6.0 billion in 2021 and RM6.6 billion in 2022 to empower Technical and Vocational Education and Training (TVET). However, currently, there are no measurement tools for assessing the Return on Investment (ROI) in TVET education within the Malaysian context. To address this backdrop, a consultation project, funded by the Economic Planning Unit (EPU), has been conducted to estimate the ROI of TVET, analyse the relationship between the level of education and the salary of graduates, as well as develop ROI measurement tool and ROI funding strategies in TVET institutions. This project focused on TVET programs based on four sectors, namely construction, agriculture, services, and manufacturing, consisting of three qualification levels, i.e., the certificate, diploma, and advanced diploma.

For further information about the project, do not hesitate to get in touch with Prof Dr Jailani Md Yunos via jailani@uthm.edu.my

Researcher's Perspectives

This segment of TVET prospect features essays from TVET experts, practitioners and researchers on perspectives that can contribute to the continual development the TVET, especially in the era of the fourth industrial revolution. Two opinion essays are featured in this volume of TVET Prospect.

The Future of TVET — Nurturing Metaverse Skills

Geopolitical uncertainties, a depressed economy, drastic climate change, the threat to biodiversity, the rapidly changing world of work, job polarisation, governance, and new technology and AI are new challenges to the TVET system in Malaysia.

The new Prime Minister has introduced a new concept of Malaysia Madani, a recent mantra by the new unity government — if properly understood by the majority of the Malaysians — it is a strategic approach to transform Malaysia into a sustainable, respected, trusted, and corruption-free country. The progress towards achieving the Sustainable Development Goals (SDGs) 2030, however, is distorted due to slow compliance of the world communities with regard to realising the green agenda.

TVET has been identified as one of the 14 drivers of change in the 12th Malaysia Plan (RMK- 12), with various strategies drawn up, including revamping the governance of TVET, promoting TVET as a brand, improving the quality of TVET programs and create a database related to TVET pathways and career matching. To streamline the governance and coordination of TVET, the National TVET Council (M-TVET) was established in December 2020 and initially administered by the Ministry of Higher Education. The council was designed to strengthen the TVET ecosystem. Among its decisions is establishing the Government-Industry TVET Coordinating Body (GITC).

However, the M-TVET council was recently moved to the Ministry of Human Resources. Still, an independent regulator to monitor the quality of TVET across 12 Ministries is absent. With 1,295 TVET training institutions and about 6,000 TVET programmes, monitoring the quality of those institutions and programmes is a significant challenge.

Recently, a permanent TVET secretariat chaired by the Deputy Prime Minister 1, Datuk Seri Ahmad Zahid Hamidi was established to regulate TVET across ministries.

Regarding the future of TVET in Malaysia, the IR 4.0 and Industry 4.0 era has introduced the usage of Artificial Intelligence (AI) and metaverse technology. Covid 19 pandemic has taught us that physical TVET training is not always viable. Hence, hybrid and immersive learning modes are slowly creeping into TVET training systems.

In the age of digital intelligence, TVET fields must move in parallel between cyber and physical know-how and competence — what can be dubbed metaverse skills. Mixed reality (VR + AR) is a typical example of a metaverse. Digital avatars are used to stimulate reality.

Vocational training using the metaverse removes the need to have much more expensive physical equipment, such as CNC machines, automotive training facilities, and welding equipment and gears. In

learning new knowledge and skills, metaverse allows learners to experience working in dangerous or challenging conditions such as underwater welding, operating open-heart surgery, or tracking booby traps in war zones without the repercussions of making mistakes or a bad choice. It is like a pilot trainee in a simulator.

In the ubiquitous disruption and digital revolution age, AI in the form of robotics is expected to reduce 50% of the full-time workers, where 1.74 million jobs are expected to be displaced due to IR4.0.

TVET sector also provides opportunities for job creation. Besides TVET practitioners, Metaverse skills could be beneficial for teachers. About 85 million teachers are currently employed worldwide, and an additional 69 million teachers will need to be recruited in the coming years.

In TVET, the metaverse is a virtual environment where apprentices work in TVET digital spaces. It is predicted that investment in digitalisation is expected to increase a country's GDP by 28%. The Ministry of Higher Education produces a digitalisation masterplan to make our universities and technical institutions more digital savvy.

The largest and fastest-growing investments in immersive technology in education are projected to attract about USD 404 billion of capital globally by 2025, amid increased recognition of the importance of technology-enabled and remote learning during the pandemic.

Malaysia targets 195 robots to 10,000 workers by 2030. Imagine if we had 6 million workers, so we need at least 117,000 robots. Some companies will make those robots, and TVET technicians will be required to maintain them.

Based on the MDEC survey, some 48% of Malaysian companies adopted digital tech platforms. About 85% of companies surveyed stated they need to adopt digital technologies and are accordingly focused on re-skilling and up-skilling their employees in digital technologies and applications. MyRIVET, as a research-based institute, could develop a new cyberTVET training model.

However, when it comes to digitalisation in TVET, there are significant inequalities among learners, TVET trainers, and the industry in their ability to develop virtual products. Cyber-dystopia could be the by-product of a schooling system lacking digital infrastructure.

The paradox of the metaverse is that it is not only virtual reality, cyber avatars and immersive games, but it has real benefits for making a living. TVET deep learning using metaverse by incorporating virtual labs is known as the avatars of simulated learning. Each person in these virtual worlds will have a digital avatar, which is essentially their doppelganger.

Metaverse economy aims to create cyber futurism. Selling a product is a standard business transaction, but selling the future is more profitable. In reality, it may be the case that any "metaverse" products could be marvellous VR games and digital avatars in the virtual world. However, the metaverse can be used for immersive virtual vocational training.

The metaverse economy can thrive when TVET students are trained to be cyber-business leaders and successful metaverse technopreneurs. Hence, a smart collaboration between training institutions, academia and the metaverse industry is pertinent for developing TVET metaverse talent. Hence, TVET systems must embrace AI metaverse technology to remain relevant and sustainable in the IR4.0 era.

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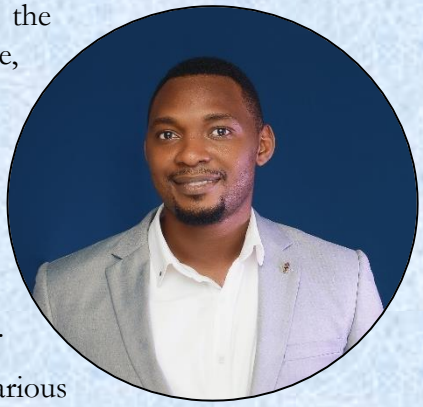
Characterising the Industrial Revolution 4.0: TVET Institutions Readiness and Contributions in Southeast Asia.



The Fourth Industrial Revolution (IR 4.0) is characterised by the integration of various technologies, including artificial intelligence, robotics, the Internet of Things (IoT), and big data, among others. These technologies have significant potential to revolutionise and transform various sectors, including manufacturing, healthcare, and transportation. In this article, I discuss the characteristics of IR 4.0, the role Technical and Vocational Education and Training (TVET) institutions can play in advancing this revolution, as well as the readiness of TVET institutions for IR 4.0, especially in Southeast Asia.

One of the defining characteristics of IR 4.0 is the integration of various technologies. This integration has led to the development of cyber-physical systems, which combine physical and virtual components to create new products and services. These systems have enhanced the automation of various processes, and the integration of machines into different industrial and manufacturing cycles has increased workplace efficiency and productivity. Furthermore, integrating big data analytics and artificial intelligence has enhanced decision-making processes, leading to improved accuracy and efficiency.

Another critical characteristic of IR 4.0 is the emergence of advanced robotics and autonomous systems. These systems can carry out complex tasks which were previously impossible for humans to achieve. For instance, with advanced robotic systems, medical practitioners can now perform intricate surgeries, technicians can now operate heavy machinery, and handle hazardous materials. This has significantly improved workplace safety and efficiency.

IR 4.0 has also led to the emergence of the Internet of Things (IoT), which enables the connection of devices and machines, leading to the creation of smart systems. These systems can communicate with each other and collect data in real time, leading to enhanced decision-making processes. For example, in the healthcare sector, IoT-enabled devices can now monitor patient health and transmit real-time data to healthcare providers, enabling them to make time-sensitive decisions.

Furthermore, IR 4.0 is also characterised by the emergence of augmented and virtual reality, enabling immersive environments. These immersive environments can be used for various purposes, including training, product development, and marketing. For instance, virtual reality can be used to train workers in hazardous environments to minimise health and safety risks.

TVET institutions can contribute significantly to the advancement of IR 4.0 by developing and offering training programs tailored to the industry's needs. This can enhance workers' skills and enable them to adapt to the changing technological landscape. Additionally, TVET institutions can collaborate with industry partners to develop and implement new technologies. This can lead to the creation of new products and services and improve existing ones.

Furthermore, TVET institutions can promote innovation and entrepreneurship among students. This can enable students to develop new technologies and products, which can contribute to the advancement of IR 4.0. Additionally, TVET institutions can collaborate with other institutions and organisations to share knowledge and resources, leading to the development of new technologies and applications.

Regarding the readiness of TVET institutions for IR 4.0 in Southeast Asia, the momentum for IR 4.0 has continued to grow worldwide. In southeast Asia, I explore this readiness level for IR 4.0 by examining the initiatives, responses and ideas put forward by TVET institutions, stakeholders, and partners.

It is pertinent to first note that Southeast Asia is a diverse region with varying levels of economic development, education systems, and technological infrastructure. However, despite these differences, the need for TVET institutions to be ready for IR 4.0 is a shared challenge for the region. In general, most TVET institutions in Southeast Asia are still largely focused on traditional vocational skills. These programs still do not adequately incorporate the latest technological developments and digital skills into their curricula. As a result, graduates from these institutions are often not well-equipped for the demands of the modern workforce, which is rapidly being transformed by the technologies of IR 4.0.

In terms of infrastructure and equipment, many TVET institutions in Southeast Asia lack the necessary tools and resources to provide students with hands-on experience with the latest technologies. For example, many institutions do not have access to advanced machinery and equipment, such as 3D printers and robotics, which are essential for training students in the skills they will need to succeed in the digital economy. Moreover, many institutions are not equipped with the latest digital tools, such as cloud computing platforms, artificial intelligence (AI) and the Internet of Things (IoT), which are essential for providing students with a comprehensive education in the digital era.

In contrast, there are some positive signs of change. In recent years, many TVET institutions in Southeast Asia have begun to recognise the importance of preparing their students for IR 4.0. For instance, some institutions partner with private sector companies to provide students access to the latest technologies and digital skills training. Similarly, several regional governments have launched initiatives to encourage technology integration into TVET curricula, such as providing funding for developing digital training programs and acquiring advanced equipment. Some research institutes have also begun collaborating on action plans and initiatives to boost the region's readiness level of TVET Institutions.

Summarily, while I believe TVET institutions in Southeast Asia still have a long way to go regarding their readiness for IR 4.0, some initiatives for progress are being implemented. TVET institutions in the region need to continue to adapt and evolve to meet the changing demands of the digital economy by incorporating the latest technological developments and digital skills into their curricula and providing students with access to the necessary tools and resources to succeed in the modern workforce. In doing so, TVET institutions can play a crucial role in helping to ensure that Southeast Asia remains competitive in the digital era.

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