Exploring Best Practices of Technical and Vocational Education and Training (TVET) Teachers in the 4th Industrial Revolution (4IR)

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ABSTRACT

This paper explores the best practices among TVET teachers in the 4th Industrial Revolution in line with the implementation of the Strategic Plan of Transformation in Vocational Education (SPTVE) 2011-2025. Two case studies from two technical institutions that offer Technology Electronic Courses were conducted. A total number of 16 TVET teachers with more than five years of teaching experience were selected purposively for the study. Data gathered from a semi-structured interview indicated that some considerationsabout best practices are related to the application of visualization methods, accelerated learning approach, the strength of a teacher, applications of projects, knowledge sharing, students-centered-learning and guided learning and the use of real equipment or tools. While keeping up with best practices is illustrated in the utilization of the internet and mass media, information digging activities, joining seminars, and sharing experiences for a real-life situation. It is suggested that TVET teachers begin to model best practices applied during SPTVE implementation and embed content and teaching principles in the classroom instruction.

Keywords
TVET, Best Practices, 4th Industrial Revolution, SPTVE 2011-2025

Introduction

TVET (Technical and Vocational Education and Training) is defined as a combination of education, training, and skill development related to a variety of occupational fields [1]. It entails formal, non-formal, and informal learning mechanisms that provide knowledge and skills for work [2]. The addition of skills to improve the existing TVET system promises to benefit both developed and developing countries, which would otherwise be difficult to achieve. These abilities not only benefit students but also aid teachers in their professional development and knowledge [3].With the arrival of the twenty-first century, new concepts emerged, including the phenomenon of a knowledge-based economy, which remains a challenge, particularly for developing countries [4].

According to [5], TVET is a broad term that refers to aspects of the educational process that include, in addition to general education, the study of technologies and related sciences, as well as the acquisition of practical skills, attitudes, understanding, and knowledge related to the occupation in various sectors of the economic and social life. TVET can be viewed as am an

integral part of general education; (ii) a method of preparing for occupational fields and effective participation in the world of work; (iii) a component of lifelong learning and preparation for responsible citizenship; (iv) an instrument for promoting environmentally sound sustainable development; and (v) a method of facilitating poverty alleviation [5].

Similarly, [6] defined TVET as all forms and aspects of education that are technical and vocational, provided either in educational institutions or under their authority, by public authorities, the private sector, or through other forms of organized education, formal or non-formal, to ensure that all members of the community have access to pathways of lifelong learning.

Developing a knowledge-based economy requires both students and teachers to think critically, communicate effectively, collaborate, and perform creatively [4]. Recent research studies have greatly aided in highlighting the benefits and gains that a developing country could gain from a streamlined and efficient TVET system. However, there is a critical need for the realization, awareness, and acceptance of 21st-century TVET skills implementation.

The role of TVET teachers in engaging and assisting all learners in learning is based on linking prior information, life experience, and desires of students with learning aspirations, fostering flexibility, engagement, and option. Teachers worked very well in the elements of developing and sustaining an appropriate atmosphere for all, establishing a physical space that includes all students, creating a culture that promotes justice and equality, promotes relational growth and community accountability, develops, and retains expectations for student conduct, prepares and introduce processes and practices to facilitate student learning [7].

There is no single best way to determine the effectiveness of a program implemented in school, neither the best method to present and describe the adequacy of every provision in a program implementation [8].The success of any country's TVET sector is primarily determined by teachers' skills and competencies, as well as their delivery methods. Best global practices can inspire and reinforce successful TVET systems.

Literature Review

Malaysia is one example of a system in which various national-level agencies and ministries collaborate to produce TVET professionals and experts who teach technical and vocational qualifications at multiple levels of education. The desirable number of teachers has increased over the years as the number of aspirant young fellows who choose the vocational route of education has increased. It is noted that ICT is high on the priority list for preparing Malaysian teachers for 21st-century TVET skills. Although the recent emphasis on cognitive skills has had an effective impact, Malaysia's Ministry of Human Resources is now aiming to create a balance among teachers to develop all three learning domains; knowledge, skills, and attitude as required for the twenty-first century [9].

The curriculum is undoubtedly one of the most important factors influencing the success and sustainability of the desired TVET teacher development program. It could ensure that participating teachers can meet industry expectations as well as a nation's educational philosophy.

Ideally, the curriculum for training TVET teachers should be conducive enough to meet current needs, which is especially difficult for developing countries [10]. Teachers will periodically update their knowledge to keep up with current education advancement and they need to attend training to keep up with their necessary professional knowledge and skills [7].

Future TVET teachers and instructors to consider preparations that need to be undertaken by TVET teachers beginning from learning tools tailored to the curriculum, teaching methods, knowledge, and competence, especially pedagogy. It is recommended to future researchers to include students' perception or their views to structure a holistic framework and new pedagogy and approaches [11]. The quality of education must find an answer that allows for a different understanding of educational practices and the use of a wide range of learning venues and technologies [12], allowing equal access and creating opportunities for lifelong learning, in times of digital transformation. TVET systems must prepare learners to participate in the present and the uncertain future in a professional and socially appropriate manner. The overarching goal of education and training must thus be based on a vision that enables the individual to continue to develop throughout his or her life, making independent decisions and acting responsibly and appropriately in private, professional, and societal contexts, to shape the society of the present and future.

The critical role of TVET in facilitating skill development for the socio-economic and technological development of countries around the world explains the growing importance that is being placed on TVET. TVET is a type of education that teaches individuals the skills, knowledge, and attitudes required for successful employment in a specific occupation. It is recommended in future pedagogy to include students' perception or their views to structure a holistic framework and new pedagogy and approaches when designing a new holistic curriculum for students [7]. Teaching methods and learning outcomes in TVET are frequently overlooked, and there is a need to investigate these two aspects to improve TVET quality [13]. If we truly want to improve the quality of TVET, we must investigate and improve the teaching methods that make it work best.

TVET is critical to promoting socioeconomic growth, increasing productivity, and eventually alleviating poverty [14]. The effectiveness of all educational systems is critically dependent on the quality of teaching and learning in classrooms, workshops, laboratories, and other learning spaces [15]. For effective results, teaching and learning in TVET should use the best teaching methods. However, it has been observed that the quality of TVET falls short of expectations in terms of teaching inputs and learning outcomes. These objectives can be met by retraining TVET teachers and trainers [16].There is a growing awareness of the need to employ new learner-centered teaching methods that will encourage and promote productive engagement among students. Teaching methods and learning outcomes in TVET are frequently overlooked, and there is a need to investigate these two aspects to improve TVET quality [13].If we truly want to improve the quality of TVET, we must investigate and improve the teaching methods that make it work best.

The term Industrial Revolution 4.0 (IR 4.0) refers to changes in production conditions and employee roles brought about by digital transformation in all economic sectors. IR 4.0 establishes the technological foundations for self-organization, self-regulation, and self-optimization of

value-added chains [17]. The digital transformation of industrial production has far-reaching implications for the skills and competencies required of skilled or competent workers [18].Disruptive digital transformation has an impact on all aspects of professional, personal, and social life. The rate of development and change continues to accelerate. Digitalization is changing the way we live and work, as well as adding new dimensions to our understanding of learning.

Pedagogy is any activity deliberately designed by a teacher to promote effective learning in students, to motivate and make the student's journey successful and productive throughout life in the twenty-first century [19].As a result, adopting active pedagogies by establishing learner-centered approaches that encourage learners to be in control of their learning is critical. Innovative pedagogy is a learning approach that defines in a new way how learners assimilate, produce, and use knowledge, skills, and attitudes in a way that equips the learner with relevant knowledge, marketable skills that will earn the learner an income, and attitudes and values that demonstrate compassion and caring for self, others, and the environment [26].

There is a need to develop innovative pedagogy that can be used in TVET schools to transform the teaching and learning domain to achieve quality skill training for students. The approach to innovative pedagogy is learner-centered and activity-based. Implementing an innovative pedagogy approach in the twenty-first century implies that the role of a teacher will shift from that of a teacher to that of a facilitator, indicating a shift from a teacher-centered to a learner-centered approach to learning [21].

Methodology

This research incorporates qualitative approaches to provide a deeper understanding of the research issues. Specifically, the study explored the best practices employed among TVET teachers during the 4IR concurrently in the implementation of SPTVE 2011-2025 in the classroom instruction of two technical institutions that offer Technology Electronic Courses. Data were gatheredviasemi-structured interviews purposively from a total number of 16 TVET teachers with more than five years of teaching experience.

Results and Analysis

A total number of 16TVET teachers (13 male and 3 female) were the respondents of the study with two different experiences of teaching ranging from experience below 10 years (7 respondents) and more than 11 years of experience (9 respondents).

The participants have different ways of best practices used to teach the students. The best practices include visualization methods, accelerated learning approach, the strength of a teacher, applications of projects, knowledge sharing, students-centered-learning and guided learning, and the use of real equipment or tools.

Respondent 1 - FI SR 001 and Respondent 8 - FI SR 008 shared that they apply the visualization method by including videos and photos as parts of the teaching approach to ensure the students get a better understanding of the subjects. The visualization method was also proven to be successfully attracting the students' interests and obtain good results in their exams:

I will associate the knowledge available to students so that they better understand and will show them the relevant photos or videos (Respondent 1 - FI SR 001).
I have carried out (visualization approach) for several years, and I see very good results. Students will become more understandable, and (my) friends also use the same way (Respondent 1 - FI SR 001).
...I use creativity practices in teaching, i.e., using teaching aids using examples of videos available on YouTube and so on (Respondent 8 - FI SR 008).
I consider It to be a best practice because it can attract students and give helping students to understand what to do (Respondent 8 - FI SR 008).

Respondent 4 - FI SR 004, in contrast, shared that he employs the accelerated learning approach where the 3D method was used to makes the student easily captured the subject he is teaching. The students were also found to be more interested in studying and quickly understanding the subject.

I do a PDPC in the form of what we call accelerated learning. It is where I use this 3D method to make it easyfor the students to capture what we want to teach (Respondent 41 - FI SR 004).
(From) What I saw, students are more interested in PDPC sessions, and they quickly understand what we are trying to convey (Respondent 1 - FI SR 001).

Based on his experience, Respondent 5 - FI SR 005 asserted that he uses his strength to teach his students in the class.

In my opinion, someone needs someone else to help understand something that they learn. As a teacher, I use my strengths to help them make it easier to understand learning while in the classroom (Respondent 5 - FI SR 005).

Respondent 2 - FI SR 002 asserted that the application of projects (hands-on) is one of the best practices to solve issues during classroom teaching.

An example where I have implemented a best practice in this field is that I applied the project to perform my work assignment (Respondent 2 - FI SR 002).
Following my experience, while working and learning previously, where doing a project is the best practice to solve problems and may also be applied in teaching (Respondent 2 - FI SR 002).

Respondent 3 - FI SR 003, shared that, in his practice, knowledge sharing based on experience is one of the best practices implemented where opinions are shared.

For the best practice that I have ever practiced in this field is to share the experience of knowledge I have ever had (Respondent 3 - FI SR 003).
By sharing, we can give opinions and (receive) opinions on (from) others (Respondent 3 - FI SR 003).

Respondent 7 - FI SR 007 practices student-centered learning and guided learning. He asserted that both are important in implementing the OBE system under the presentsystem.

Examples of the best practices I practice in my field of electricity technology are the application of guided training or student-centered learning which is the essential practice in the implementation of the OBE system (Respondent 7 - FI SR 007).

Because in our system, the application of the hobby value is the method of teaching and facilitation applied in the country's higher education system (Respondent 7 - FI SR 007).

Respondent 6 - FI SR 006 use real equipment or tools during the theoretical classes and students can quickly understand the lessons.

The example where I have implemented a best practice in this field is that I show real tools to students when making theoretical classes (Respondent 6 - FI SR 006).
It can help my students to quickly understand the lesson (Respondent 6 - FI SR 006).

In keeping up with best practices in their areas, the participants gain additional information via the internet and mass media, join seminars, based on experience and information digging.

Respondent 4 - F1_SR_004, Respondent 7 - FI SR 007, and Respondent 8 - FI SR 008 shared that the use of the internet and mass media can provide a better understanding of the students by getting more updated information.

For me, it able to give the student more understanding. So, usually, getting the latest information about best practices in this field is common via the internet (Respondent 4 - F1_SR_004).
Often, we share information in electronic media, mass media. So, the knowledge we have, we apply in our PDPC (Respondent 4 - FI SR 004).
The benefits of applying this practice principle to my organization are that my organization is always on track and up to date with regards to the method of delivery to students and how the latest information on best practices in this field is obtained from the Ministry of Education which can be accessed via the web (Respondent 7 - FI SR 007).
The benefits of the principles of this best practice to my organization are that it helps the instructors to provide tutoring and knowledge to students with more focus on getting the latest information on best practices in this area, i.e., electrical technology I will look to other power requirements from the website of the Ministry of Education and on the internet (Respondent 7 - FI SR 007).

Respondent 6 - FI SR 006 added that the information-digging activities such as reading, experience, and sharing from friends also helpful in enhancing the understanding of the students.

Students will become more understandable, and I get information from reading, experience, and sharing from friends (Respondent 6 - FI SR 006).

Other than obtaining information from the internet, based on own experience in the industry, Respondent 2 - FI SR 002 also added that joining seminars also one way to obtain new information in the field.

Using this principle, the benefits are that all forms of work that we do will become more efficient and organized, and systematic. How do I get the latest information about the best in this field is by adding knowledge by attending seminars recommended by the management or from previous experiences in the industry as well as media, internet video (Respondent 2 - FI SR 002)?

Respondent 3 - FI SR 003, on the other hand, shared that sharing of experience can also be one of the ways to obtain the latest information.

The benefits of this best practice principle to an organization. For example, I share information on electrical knowledge to students (and) it will enhance students' knowledge regarding electricity, and how I know through the latest information on the best practices in your field is through experience. (Respondent 3 - FI SR 003)

Discussion

Teachers' abilities to contribute effectively to society in the context of teaching and learning are constantly changing. Teachers are frequently failing to develop the practices and skills needed to meet the diverse needs of today's learners [22]. From the perspective of classroom observations, it is necessary to be able to differentiate between concurrent behaviors because doing so will allow us to better discern how these behaviors relate to key dimensions of the classroom environment that support student learning. Relatedly, to develop 21st-century learners, the focus is given on teachers' 21st-century skills and rethink how to evaluate and train teachers. To accomplish this, a constructivist perspective on what happens in classrooms and teachers' practices is recommended to be utilized.

The emphasis in the classroom is on processes and practices, shifting the focus away from what is being taught and toward how something is being taught. [24] propose that one method for closing the knowledge gap in classrooms is to conduct systematic behavioral observations to document teaching practices. This is possibly because what they see in classrooms is directly related to what teachers do in practice and provides a more concrete basis for information that teachers need to improve [25].

Examining processes and practices in the classroom shifts the emphasis from what is taught to how it is taught. The core processes and practices are active in any given classroom at the same time. However, clear distinctions must be made between performance and behavior to support students' learning. Critical thinking, problem solving, creativity, metacognition, communication, digital and technological literacy, civic responsibility, and global awareness are also regarded as 21st-century skillset competencies [23].

One method for closing the knowledge gap in classrooms, according to [24], is to conduct systematic classroom observations to document teaching practices. Evidence from Western countries suggests that classroom observations are more valuable to teachers and school leaders than other value-added measures [25]. This could be because what they observe in classrooms is directly related to what teachers do in practice, providing a more concrete foundation for information that teachers need to improve [25]. There is a strong need to proceed with greater consideration for the various contexts; teachers are evaluated and receive professional

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development as the key to long-term development, including self-awareness, collaboration, and critical thinking [26].Hence, there is a need for TVET stakeholders to step up their advocacy efforts to encourage TVET teachers to embrace innovative pedagogy, as this will help improve learning outcomes. There is convincing evidence that the teaching method is a strong predictor of learning outcomes. To improve the development of TVET systems, specific TVET research is needed. The established discipline of vocational education science is a critical systemic prerequisite for development of regular research and knowledge systematization, but it is rarely considered.

Conclusion

In summary, from the data gathered in the study, the participants have different ways of best practices used to teach the students. The best practices include visualization approach, accelerated learning approach, experience-based, application of projects (hands-on), knowledge sharing (based on experience), student-centered learning, and the application of real equipment. It is also indicated that, in keeping up with best practices in their areas, the participants gain additional information via the internet and mass media, join seminars, based on experience and information digging. TVET teachers must constantly expand their capacity; in addition to subject knowledge, subject-related didactics, educational sciences, and psychology, a teacher must also be capable of diagnosing, evaluating, collaborating, and developing quality. TVET teachers must have the necessary personal, ethical, professional, and teaching qualities, and they must have a significant influence in shaping students' attitudes and aspirations. A well-prepared TVET trainer will be able to function in and adapt to a constantly changing scientific, technological, and social environment.

The goal of exploring best practices of TVET teachers in this study was to find ways to TVET learners, motivate them to learn, effectively enhance skill training, and improve student performance. Continuous professional development for TVET teachers is necessary for them to acquire their necessary skills for implementing new ways of teaching in the classroom instruction.Through participatory research approaches such as action research, vocational education experts should ideally gain access to internationally available knowledge to avoid conducting inefficient or redundant research to contribute to the improvement of TVET systems. They could also include their own personal experiences. International collaboration aids scientists in their desire for answers and solutions.

Education in the twenty-first century necessitates teachers with advanced competencies and knowledge to promote human resource development in our country. To meet the challenges of preparing TVET teachers for the 4IR pedagogy, the complexity of teachers' knowledge and competencies in TVET must be more dynamic. The cycle of teaching will become completely competent through continuous improvement based on internal motivation to gain knowledge and strengthen competencies. The current technical competencies differ from those required for IR 4.0, it is recommended that TVET institutions begin restructuring the learning process of learning software and network structures to master big-data technologies. They should also learn to work with different data formats, understand and master processes, collaborate, and communicate intensively, and initiate more innovations.

The classroom is the setting in which students observe their teacher's modeling skills. Teachers will not be able to model teaching practices if they do not know how to identify them. This is an important issue not only for observational training but also for teacher feedback and professional development, and it is one of the primary reasons why identifying culturally relevant manifestations of teaching practices is required. A clear feedback is the key to improve teacher practices with the right tools of teaching is available to support the process of instructional practices. These should be administered regularly to encourage self-reflection and continuous improvement. Only by completing such 21st century teaching skills will be able to improve students in 21st century learning, in line with the implementation of SPTVE.

Acknowledgment

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