

STRENGTHENING TECHNICAL AND VOCATIONAL EDUCATION (TVET) - PRODUCING INNOVATIVE TVET TEACHERS FOR 21ST CENTURY STUDENTS

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ABSTRACT

Skill workers produced in Malaysia is provided by several agencies under the Ministry of Education, Ministry of Higher Education, Ministry of Human Resource and various Public Sectors. Preparation on Technical and Vocational Education and Training (TVET) trainers and teachers are trained by various agencies under the Ministry of Education, Ministry of Higher Education and Ministry of Human Resource. Vocational subjects have been taught in both school, Vocational and Academic Schools. However, supply of TVET teachers for Secondary School fall under Public HEI's. The increasing number of students interested in joining vocational course cause increasing number of vocational teachers to cater students' need. In handling duties and responsible to educate students specially those who are exposed to the ICT in 21st century has become a challenge to the teachers. In order to overcome this matter many steps have been taken to ensure teachers' training conducted would be able to assist lecturers in HEIs' produce TVET teachers who have mastered the skills in 21st century. Steps taken to ensure TVET program able to fulfill nation aspiration with the strength curriculum implementation, that is, combination of cognitive skills and hands on in curriculum. Therefore, the curriculum development, merging of skilled and academic qualifications with collaborations between different institutions under the ministry of Human Resource and Universities has been implemented. In future, greater emphasis on psychomotor skills development among TVET teachers will lead to equal emphasis on cognition, psychomotor skills and an affective domain.

(Keywords; TVET, Teachers Training, 21st Century skills)

Introduction

Malaysia is in the process towards developed country status. In order to achieve developed nation status, several things need to be given particular attention by authorities, such as, the addition of energy-related work in the field of technical and vocational education. This is because the core of the developed countries is the rapid industrial and industry requires a skilled workforce in the industry itself. The importance of technical and vocational education is seen as an important agenda for the industry to generate momentum. TVET is provided by several agencies under the ministry of education, higher education and human resource. In relation to the technical and vocational education (TVE) visits need to be empowered and become the

main agenda of the country to achieve developed nation status is MOE's vision and mission to produce students with 21st century skills in line with Vision 2020 (MOE, 2007). The TVET empowerment and development is the aspect of economic, political, social, spiritual and cultural sector. This clearly reflects in our national aspiration to ensure Malaysia to be the citizen who has the intellectual capital as well as highly skilled.

TVET National System

TVET systems in Malaysia have started in getting attention when specifically mentioned in the Rahman Talib Report (1960). The report recommended in the Education Act 1961 which has been devoted ambitions contained in the Razak Report outlines the intention of the National education systems available today. There are four important aspects in this report and one of the reports content is "*emphasizing TVET for the needs of skilled manpower.*"

Cabinet Report (1979) after several years of education system based on Rahman Talib Report implemented, a study was conducted to investigate the ability of the education system in responding to the challenges of science and technology and the New Economic Policy. The results of this study in the Cabinet Report in 1979, outlined six important aspects that need to be addressed in the education system in Malaysia. One identified as a need to emphasize the "upper secondary education through academic and vocational". TVET teachers are also trained by various agencies under ministry of education, higher education and human resource. Training provision for TVET teachers under the Ministry of Education categories under HEI. TVET has a role to introduce the concept of working in student's world. It is precisely mentioned that vocational education should be given adequate exposure to working environment.

The sixth challenge in Vision 2020 are shown as,

"Creating a community that is progressive and inventive science and much more to come, that a society can not only take advantage of technology now, but also a contributor to the development of science and technology culture in the future."

(Vision 2020)

In vision 2020 the sixth challenges is important in the years to economic slow economy growth. TVET plays a significant role in bridging the gap between the curriculum and working environment which is a catalyst to increase the nation's economy. There are four areas that need to be prioritized in the current TVET, Science and Technology (Design), information and communication technology (ICT), market and industry and modernization. As a result of technical and vocational education should be strengthened and should be the main agenda of the country to achieve developed nation status.

TVET Challenges

TVET weaknesses in the early years of implementation in the 1960s is significant due to the curriculum that provides skills or specific knowledge is limited and without a strong academic foundation (Abdul Shukor, 1997). Recognizing this fact in the years 80's TVET system has been injected with a few changes to make it more interesting and meaningful (Yahya, 2007) by giving priority to the subjects of mathematics, science & technology and technical skills. However, due to rapid technological change, the TVET system is not be able to catch up and meet the needs of the new millennium era. Drastic changes in technology and cause ongoing training provided in TVET institutions sometimes was unable to fulfill the requirements of the industry or the employer Soo Wee Leng and Juma'ayah Salleh (1997). Students in the 21st century when they are in adulthood, they face challenges and unimagined by their ancestors. Therefore, TVET need to change to ensure new skills can be developed rapidly.

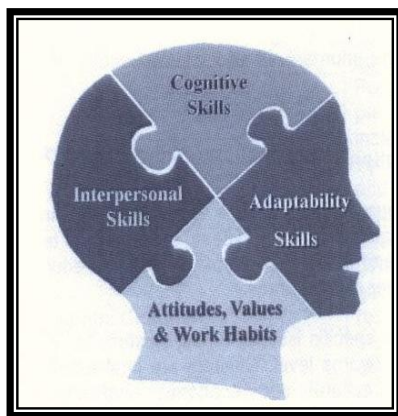


Figure 1: Cluster of 21st century skills

Work & Values Clusters	Interpersonal Clusters
<ul style="list-style-type: none"> ✓ Basic IT Skills ✓ Self-management ✓ Time management ✓ Attitude & Values 	<ul style="list-style-type: none"> ✓ People Skills ✓ Communication ✓ Team Work ✓ Customer Orientation ✓ Cultural Understanding
Cognitive Clusters	Adaptability Clusters
<ul style="list-style-type: none"> ✓ Learning to Learn ✓ Problem Solving ✓ Critical Thinking ✓ Innovation 	<ul style="list-style-type: none"> ✓ Flexibility ✓ Ability to adopt ✓ Conflict resolution ✓ Negotiation

Teaching and learning method in 21st century is more towards student centered. Competency Based Assessing Projects is a resource designed for those committed to the method of teaching and learning. Confronting a never-ending supply of digital devices and overwhelming amounts of information, individuals in today's society must be proficient in a variety of skills and strategies that were not critical for their grandparents' success. These 21st century skills include:

- **Accountability and Adaptability** — Exercising personal responsibility and flexibility in personal, workplace, and community contexts; setting and meeting high standards and goals for one's self and others, tolerating ambiguity
- **Communication Skills** — Understanding, managing, and creating effective oral, written, and multimedia communication in a variety of forms and contexts
- **Creativity and Intellectual Curiosity** — Developing, implementing, and communicating new ideas to others, staying open and responsive to new and diverse perspectives
- **Critical Thinking and Systems Thinking** — Exercising sound reasoning in understanding and making complex choices, understanding the interconnections among systems
- **Information and Media Literacy Skills** — Analyzing, accessing, managing, integrating, evaluating, and creating information in a variety of forms and media
- **Interpersonal and Collaborative Skills** — Demonstrating teamwork and leadership; adapting to vary roles and responsibilities; working productively with others; exercising empathy; respecting diverse perspectives
- **Problem Identification, Formulation, and Solution** — Ability to frame, analyze, and solve problems
- **Self-Direction** — Monitoring one's own understanding and learning needs, locating appropriate resources, transferring learning from one domain to another
- **Social Responsibility** — Acting responsibly with the interests of the larger community in mind; demonstrating ethical behavior in personal, workplace, and community contexts

Challenges	Critical Factors
<ul style="list-style-type: none"> • Design and implement flexible system. 	<ul style="list-style-type: none"> • Evaluation system.
<ul style="list-style-type: none"> • Strengthen vocational education system. 	<ul style="list-style-type: none"> • Curriculum of vocational education. • Pedagogy
<ul style="list-style-type: none"> • Sponsorship of vocational education. 	<ul style="list-style-type: none"> • Optimum in return • Involvement in public sector • Training opportunity for public sector
<ul style="list-style-type: none"> • To have relationship between industry and institute 	<ul style="list-style-type: none"> • Curriculum Development • Evaluation Product • Development of Teaching and Learning Material • Advisory Board
<ul style="list-style-type: none"> • Standard Skills 	<ul style="list-style-type: none"> • Professional Body accreditation.
<ul style="list-style-type: none"> • Educational Culture for lifelong learning 	<ul style="list-style-type: none"> • On-line learning infrastructure and promotion
<ul style="list-style-type: none"> • Increase and verify vocational leaver 	<ul style="list-style-type: none"> • Certification equality to academic achievement.

Table 2: Challenges and the Critical Factors in TVET teachers' development

Refer to Table 2, clearly shows all the challenges and critical factors listed in connection with the variable "highly skilled educator" to address the challenges in the TVET at global. Therefore, the first challenge is actually focused on all those involved in Technical Teacher Education programs (Education).

TEACHERS EDUCATION PROGRAM (TEP)

Teachers are the foundation of the education system. They are the implementers of the policies and goals set by the government through the Ministry of Higher Education (MOHE) and Ministry of Education (MOE). Thus, TEP is important to provide teachers with professional skills in order to ensure teachers enable to teach effectively especially providing skilled teachers to teach in secondary schools. Therefore, TEP which involved directly in development of human capital must be obtained from excellent teachers. Various way has been implemented to obtain excellent teachers including will be dotted less of education / training / course / supplied to the teacher. Malaysia needs more trained teachers in the field of Technical and Vocational Education as a result of the increase in the number of TVET institutions in Malaysia. Technical and Vocational Education has been the choice of a large number of primary and secondary school students. Vocational subjects are also taught in academic schools. Increase the number of teachers is also needed because there increase the number of students interested in technical and vocational streams, and there is supply of technical subjects in schools and boarding

schools are selected. The increase in the number of students because of the perception change society. Parents and students know about the importance of working with vocational and technical skills and the importance of job market demands that have relevance to the needs for economic development. In addition, after 1990's, high prospect in job market caused PTV was highly selected and demanded by students.

TEACHERS COMPETENCY IN TVET

Teachers Education Training is intended to provide technical and vocational teachers with skilled in planning and managing effective teaching and learning at the Technical Secondary School and Vocational High School to address the challenges of Vision 2020. Teachers in Technical and Vocational education generated by the organization are expected to play an effective role in producing human capital that is knowledgeable, competent, attitude, character, positive attitude, dedication and discipline. In fact, the role of TVE teachers are not limited to create the right skills in technical and vocational, as well as in terms of soft skills such as language skills, communication, creative, willing to face the challenges and looking forward in order to achieve the goals of Vision 2020.

Therefore, Teacher Education Programs took a challenge to produce TVET students (future teachers) who do not only have the knowledge, but they also need to have technical skills and soft skills as well including communication skills, problem solving, leadership, teamwork, continuous learning and information management, entrepreneurship, ethics and professional morality, decision making, interpersonal and management (Ministry of Higher Education, 2006; and Universiti Tun Hussein Onn, 2007), These skills help them to compete with human capital than other countries in the international arena .

In conjunction of the future teachers need to have complete skills, the curriculum should be infused TVE Teacher Training to produce graduates who meet the aspirations and needs of individuals, communities and countries. One of the most challenging aspects and often disputed the extent to which the teacher education program organized by the university really able to train an outstanding educator and a genuine professional class? Excellent teacher education programs to produce excellent teachers and professionals where they should be knowledgeable and skilled in their respective fields and is responsible for carrying out professional duties. Professional practice are:

- a) behaviour professionals and committed to adhere to the requirements of ethical reflection on teaching and learning tasks.
- b) determined to constantly learn and expand his knowledge of expertise.
- c) actively involved in improving the professionalism, involved in efforts to reform education, certification and accreditation of teachers, professionals such as management involved in decisions about the conditions for cooperation in making decisions about working conditions in the field of teaching.

Excellent teachers are those who are qualified and able to produce students become balanced in terms of emotional, spiritual, physical and intellectual. Personality excellent teachers should be able to integrate knowledge and worldly eschatology in order to develop the students becomes integrated so that students can understand the role of self, community and country. Among the features of excellent educators are;

- a) high professional commitment.
- b) specialists in all areas and able to conduct workshops and manual and electronic tools
- c) willing to share experience
- d) ability to teach main idea and the subject content.
- e) ability to manage students.
- f) able to work with students, colleagues and parents.
- g) ability to serve the development of social and cultural values.
- h) demonstrate a strong commitment.
- i) be prepared to learn new things, especially related to technology.

In short, the quality characteristics as having high knowledge, creative, constantly renewing knowledge and good at presenting the knowledge possessed by current methods. For example, teachers must be computer literate, sensitive to how the use of computers in teaching and learning. Educators also must have a meritorious nature, such as the attitude of a caring, gentle, good interaction, good at solving problems that many students, and are willing to spend time outside school to deepen students' problems and engage in co-curricular activities. These include the family problems of students.

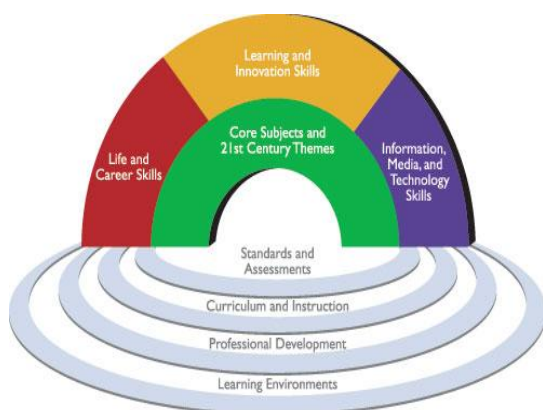


Figure 1: Framework concepts components as fully interconnected in the process of 21st century teaching and learning.

UTHM ROLE IN STRENGTHEN TVET

UTHM through the Faculty of Technical Education (FPTek) plays a major role in strengthening and highlighting the TVET to National and International levels. FPTek has been awarded by UNESCO as UNESCO-UNEVOC International centre for Technical and Vocational Education and Training on 25th November 2007. UTHM was relevance of TVET institutions in Malaysia is described.

UTHM through teacher education programs produce TVET teachers in teaching and educating individuals to be knowledgeable and skilled in technical and vocational fields. UTHM teacher education programs is not only emphasize the academic aspect but also in such a way designed to produce graduates with skills vocational recognized national skills body. This means that graduates UTHM concerned not only with the knowledge and skills or the skills and knowledge in education as well as soft skills and technical skills but also has a high capable in vocational skills.

UTHM contributes in important role to support of TVET has increased from time to time in accordance with the requirements of the country in producing skilled manpower for the knowledge-based technical and vocational skills. The increase in this role can be seen from the development of FPTek structure starting from the Department of Education and Humanities at the Institut Teknologi Tun Hussein Onn in 1996 to the Department of Technical and Vocational Education in 2001 at the Tun Hussein Onn University College and the Faculty of Technical Education at the Universiti Tun Hussein Onn Malaysia beginning May 1st, 2004. In an effort to enhance the national TVET, FPTek has implemented academic programs at the doctoral degree, graduate, undergraduate and postgraduate diplomas include diplomas in particular academic program consists of the following academic programs:

- i. Doctor of Philosophy in Technical and Vocational Education (PhD)
- ii. Master of TVE (Taught Courses)
- iii. Master of TVE (Research)
- iv. Bachelor of Technical Education (Civil Engineering)
- v. Bachelor of Technical Education (Electrical Engineering)
- vi. Bachelor of Technical Education (Mechanical Engineering)
- vii. Bachelor of Technical Education (Instruction Design and Technology)
- viii. Bachelor of Technical Education (Industrial Electronics)
- ix. Bachelor of Technical Education (Production Technology)
- x. Bachelor of Technical Education, majoring in education on the National Dual Training System (NDTS) in collaboration with the Ministry of Human Resources
- xi. Bachelor of Technical and Vocational Education
- xii. Diploma in Education.

At present FPTek in an effort to provide the program with a Bachelor of Vocational Education (Majoring) in Catering, Electrical and Electronic Engineering, Creative Multimedia, Building Construction, Welding and Metal Fabrication, Machining, Refrigeration and Air conditioning. This program aims to produce teachers who will work in vocational secondary schools. The strength of the planned program is about training and awards given to prospective teachers in FPTek.

Refer to table 4, students are given the exposure and skills training in specialized vocational schools. Candidate will be awarded with Malaysian Skills Certificate which has been recognized by the Department of Skill Development as well as certificate of qualification to teach skills (Vocational Training Officer).

Students are given an exposure in dual system of training through industrial attachment.

Majumdar (2010), proposed on TVET teachers training for future ITE as;

a) Initial Teacher Education

Initial Teacher Education must be according to two basic models which is called 'Consecutive' and 'Concurrent' model. Consecutive means teacher should obtain their first degree and followed by pedagogical knowledge to be qualified teacher. In the alternative 'concurrent' a scholar simultaneously studies both one or more academic subjects, and the ways of teaching that subject, leading to a qualification as a teacher of that subject.

b) In-Service Education and Training

The meaning of 'in-service education and training is changing, and it varies from country to country, depending on the level of preparation teachers receive prior to their entering the profession. Broadly there are four categories of education and training such as:

- For unqualified teachers (mainly certification courses);
- To upgrade teachers;
- To prepare teachers for new roles, such as teacher educators or principals;
- Curriculum related, particularly when there are curricular changes in the system, or when teachers require some form of refresher course.

However, it is also noted that there are some limitations in such programs such as;

- i. There is a lack of clarity on the part of the participants, concerning the aims and objectives of this kind of training;
- ii. Many in-service activities do not target the main goal of improving the professional competence of teachers;
- iii. It is too often the case that in-service training providers transmit the knowledge and skills they have, regardless of their relevance to the recipients;

c) Teacher Development or Continuing Professional Development

As Net Generation students leave college and enter the broader society, "the ability to deal with complex and often ambiguous information will be more important than simply knowing a lot of facts or having an accumulation of knowledge."

As a result, professional development is an integral component of TVET teacher development. It is an ongoing activity designed to increase levels of expertise and understanding. It should be a process that works individually with the strengths and needs of a specific TVET teacher or faculty in order to create higher capability and understanding. Continuing or Continuous Professional

Development, Staff Development and Mentoring are other common terms used in this area.

Subject Component		Credits	Credit Hour	Percentage (%)
Compulsary University Subject		20	20	15%
Vocational Subject	Education Core Subject	28	74	55%
	Vocational Core Subject	34		
	Teaching Practices	8		
	Industrial Training	4		
Command Subjects		41	41	30%
Overall Total Credits		135	135	100%

Table 4: Total of Credit hours for Bachelor of Vocational Education (Majoring) in Catering, Electrical and Electronic, Creative Multimedia, Building Construction, Welding and Metal Fabrication, General Machining, Refrigeration and Air conditioning.

Education diploma program is offered to graduates of first degree graduates. This program provides professional training for university graduates *to become* high school teachers who will teach technical and vocational subjects such as Technical Drawing, Engineering Technology, Life Skills, Technical Building, Technical Skills and Electrical and Electronic Based on the strength of existing organizations and programs, particularly FPTek, and UTHM general, to generate highly skilled educators through the efforts of the following Teaching Problem-Based Learning (PBL) including;

- a) Argument /Bidding Skills
- b) Application of Soft Skills
- c) Master and Bachelor projects
- d) Research
- e) Writing Journals
- f) Colloquium, Seminar and Conference
- g) Vocational Education Degree Program Offerings
- h) Finishing School Program

Apart from these efforts, FPTek is in the process of working with various key players in industries in order to strengthen teacher education programs implemented. Industry involvement in teacher education programs will be expected to help strengthen our program. Industry involvement in the development of strategies, including practical training, skills upgrading, infrastructure and financial assistance. Furthermore, other cooperation provided by the industry are;

- a) sending lecturers and instructors who are experienced in their respective fields to assist in teaching duties and assist in facilities or machine maintenance.
- b) Placement acceptance of lecturers, instructors and technicians into the local industry for gaining a real working environment and familiar with types of machines and technology used.
- c) to supply machinery and technical support to future teachers UTHM to do something practical to use actual equipment.
- d) Collaboration with Industries- apply Teaching factory in HEIs'
- e) Apprenticeship practice.

UTHM TVET program also requires that certain teachers would undergo industrial training in technical skills, as well as teaching them to be able to adapt the theory learned in a real working system.

CONCLUSION

Technical Teachers Training Institute generally should be more proactive to ensure the development of TVET to be consistent and active. UTHM plays important role in providing a quality workforce. Education today is expected to produce features that match the needs of citizens of the human resources in the future as embodied in the National Education Philosophy and Vision 2020. TVE must brave to face several challenges to support the government and compete to be an innovative and developed country in international level. Attitudes of society itself must be changed so that people give more positive attitude towards VTE. Despite changes in attitudes and values of a society that will take a longer time, but efforts should be undertaken from now on. Young people should be inculcated with the knowledge skills, techniques, soft skills, attitudes and norms of the good life that they can become high skilled workers. Intention of it must start from the teacher education program that generated by the training institutes such as the FPTek UTHM, Malaysia University of Technology (UTM), Universiti Putra Malaysia (UPM), Universiti Pendidikan Sultan Idris (UPSI) and Universiti Kebangsaan Malaysia (UKM).

A great challenge to the TVET should be addressed to ensure achieve developed nation status in 2020. It cannot be denied that the foundation of vocational education in the country has already built up that will enable us to plan and move towards that goal. However, the challenge we will face in the coming years, especially in the economic crisis facing the country today, vocational educator should have the competitive and sensitive to the changes occurring around it. They must have sufficient skills and the employees / teachers who are well educated. Educated population will strengthen the economy and the strong economy builds a respected country in the world.

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