TECHNICAL VOCATIONAL EDUCATION & TRAINING (TVET) IN MALAYSIA : SELECTED WORKS

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Contents

Foreword

Technical and Vocational Education and Training (TVET) will play a pivotal role in providing the skilled workforce required for Malaysia's economic transformation and the next stage of her growth. It is the pathway of the 21st century, the way forward to close gaps between economies of the globe, and vital to meet the demands of a technologically complex and unique future. I believe that a pool of highly trained TVET graduates will be able to attract investment, drive productivity, and enhance innovation.

Under the 11th Malaysia Plan (11MP) tabled by the Prime Minister in May 2015, it was projected that 1.3 million additional jobs in Malaysia will require TVET related skills by 2020. This will make TVET the most important avenue for increasing Malaysia's skill human base. In preparing Malaysian youth to take advantage of the new opportunities under the 11MP, the Malaysian Education Blueprint 2015-2025 (Higher Education) was formulated by the Ministry of Higher Education Malaysia. One of the key aspirations for TVET under the blueprint is for it to be on equal footing with traditional academic pathways. Young adults must see the benefits of TVET and take up TVET programmes in tertiary education.

To achieve this, the Ministry has carefully sequenced the strategies and initiatives of TVET across three waves. The first wave is to initiate TVET enhancements with industry-led curriculum design and delivery, upgrading of teaching staff, and producing a portfolio of high technology and high value programmes. The second wave will harmonize the national TVET qualifications framework with other agencies, and facilitating international accreditation. Finally, the third wave will witness the rebranding of TVET to achieve a dual pathway higher education system where academic and TVET pathways are equally valued.

Mainstreaming TVET is vital for the nation's future. I am confident we can achieve our goals with the full support and cooperation of our stakeholders – academicians, industry, students and the society at large. The Ministry is certainly committed to the cause.

DATO' SERI IDRIS BIN JUSOH
Minister of Higher Education
Ministry of Higher Education

Preface

Technical and Vocational Education Training (TVET) is one of the critical drivers in the Eleventh Malaysian Plan to elevate Malaysia into a high income country and visualize her ambition to attain the developed nation status by 2020. The Malaysian Education Blueprint 2015-2025 (Higher Education)(MEB(HE) has laid out the foundations for TVET to achieve prominence in education pathways that provide employment opportunities and an attractive career choices and further education prospects. The transformation of Malaysian TVET is expected to make TVET graduates meet the demand of industry and contribute towards economic growth.

The expectation that TVET will contribute to bridge the gap in the economies of the globe is great. To examine the success of the implementation of the MEB(HE) in TVET and to appraise the current development of TVET in the nation, policy makers, stake holders and elected representatives will need to make informed decision that are supported by evidence-based information. To this end, an effort has made to compile scholarly work on diverse aspect of TVET. This compilation of published research articles will serve as a guide to assist those involved in TVET at any level to make informed decision by giving reviews and critical analysis of various aspects of TVET. The findings, views and suggestions put forwards by the authors could also function as a reference tool to provide solutions to existing problems and contribute to enhancement of TVET.

Since Malaysia has embarked on a very comprehensive effort to strengthen its higher education system to equip Malaysian with skills and knowledge towards becoming a high-income nation, this book represent an important scholarly work that examines important matters such as the performance of Malaysian Polytechnic, readiness of vocational education on the use of e-portfolios, the need of up scaling TVET lecturers and much more. I hope that this compilation will be of benefit to both researchers and policy makers involved in TVET. I commend the Malaysia Citation Center for spearheading this project which undoubtedly will contribute to critical reflection of higher education in Malaysia.

TAN SRI DR. NOORUL AINUR MOHD. NUR
Secretary General
Ministry of Higher Education

INTRODUCTION

TVET for Human Resource Development**

Ab Rahim Bakar
Universiti Putra Malaysia

Human resource development is pivotal in ensuring that Malaysia has a dynamic labor force globally competitive. Educated human resource is the very core of innovation and high productivity, thus investing in the development of human resource should be the most important investment of a country. No economy can succeed without a highly skilled workforce that can respond creatively to sudden economic changes. The emerging technologies and globalization influence the future demand of skills and expertise worldwide. If Malaysia is to be in the world arena, Malaysia has to have a workforce that has the ability to adapt and adjust to the changing demands of technological advances in the knowledge-based economy. In fact, the thrust of human resource development as outlined in the OPP3 is to prepare a workforce that is capable of meeting challenges of a knowledge-based economy to enhance the productivity and competitiveness of the economy.

Human resource development cannot be taken lightly. This is a competitive world. If it is taken lightly the country may not be able to compete in this globalized world and will be left behind. Human resource development through TVET is an investment to enhance productive capabilities, the utilization of those resources to produce higher output, and the consumption by those human resources of the benefits arising from the increased output, thereby leading to an enhanced quality of life. A good human resource development policy must emphasize the development of highly skilled workers and it can only be done through good TVET system. TVET system that is developed has to be a thoroughly thought system and it cannot be a system that is developed on an ad-hoc basis.

Technical and vocational education and training (TVET): The meaning

UNESCO (2002b) defines technical and vocational education and training (TVET) as those aspects of the educational process involving, in addition to general education, the study of technologies and related sciences; acquisition of practical skills, and attitudes; and understanding and knowledge related to occupations in various sectors of economic and social life. TVET is known by many other names in some countries and regions. Among the names are: Apprenticeship Training, Vocational Education, Technical Education, Technical-Vocational Education (TVE), Occupational Education (OE), Vocational Education and Training (VET), Professional and Vocational Education (PVE), Career and Technical Education (CTE), Workforce Education (WE), and Workplace Education (WE). Even though TVET is known by different names, essentially TVET means the same.

Traditionally, vocational education has been identified with educational provision that is directed to occupational learning for types of work that are seen as requiring only lower-level skills, commonly 'manual' rather than 'intellectual' skills, and which may be taught, because of that, through focused 'training', rather than through a more expansive engagement in 'education' (Moodie, 2002). However, with current changes in the world of work and labor market, the orientation of TVET has changed. TVET does not engage itself entirely on the preparation of workforce for low-level jobs. Now TVET is recognized as one of the most important keys to sustainable development. In fact, TVET enhances human capital development for industrialization. It is through programs like TVET that makes a country able to produce high skilled workers needed to propel the economic growth.

TVET has been getting attention from the United Nations Educational, Scientific and Cultural Organization (UNESCO), the World Bank and many bilateral aid agencies due to the important roles TVET has played in the development of a nation. For example, by 2020 as a result of GTP, 3.3 million new jobs will be created in Malaysia and 46% of these jobs requires vocational certificates (24%) and diplomas (22%). TVET is entrusted to provide those workers needed by the nation's vision that is to become a fully developed and a high income nation by 2020. TVET helps develop the economy of a country by providing skilled workers for the labor market. However, as stated by the National Economic Advisory Council (2010), at that time the country was experiencing a shortage of skilled labors and over reliant on low skilled and low-wage migrant workers. As stated in the 10th Malaysian plan, high skill workers in Malaysia was lower compared to

a significantly higher proportion in countries like Singapore, Chinese Taipei, and Korea. Thus, the government wants skills training to be given special emphasis under the 10th MP to ensure Malaysia develops the needed human resources. The Government keeps encouraging more school leavers to enroll into Technical and Vocational Education and Training (TVET) and skills training courses to facilitate the creation of a skilled workforce essential for the country to scale up the value chain and achieve high-income nation status. The Government also wants to increase enrollment in TVET programs in schools from currently 10% to 20%.

Initiative, such as the allocation of a large sum of budget to train students in technical and vocation skills to address the issue of skills shortage has been made. Through such initiative, the government provides loans for trainees to undergo skills training, up-grading and repair building and purchase equipment for training purposes at several industrial training institutes. This is made to ensure that by 2020, 50% of our workforce will be in a high skilled job bracket. In AEC itself, the demand for high skilled workers is anticipated to increase, but there will be mismatch and shortages. As a result, it is anticipated that the jobs will be filled by under-qualified workers.

Vocationalizing the Education

TVET is an instrument of social policy. It assists people in particular social groups such as those in poverty or who lack marketable skills to improve themselves. To achieve all these, especially in the changing economy, a country needs a strong TVET system and it has been shown to be true in some countries. Strong economies, such as Germany, Japan, South Korea and Singapore all have well-developed vocational and technical education (VTE) systems.

For example, in the Republic of Korea, the employment rate for four-year college graduates was 56.7% in 2003. Nevertheless, for vocational high school graduates, it was 92% (KEDI, 2004). It shows that there is an unemployment issue among students with a four-year college degree. Many of them are not immediately employed after graduation, some are employed in areas remotely related to their studies, and some are underemployed. An initiative known as reverse transfer has to be implemented to overcome the issue of unemployment among graduates and we are doing it in Malaysia. Reverse transfer means enrolling an individual in certificate program after they have completed four-year or graduate degree programs for them to acquire new sets of skills. In relation to reverse transfer concept, Malaysia introduces graduate training scheme such as SPIKE program as

a way to provide some other technical skills to match the industrial needs. SPIKE program was intended for training unemployed graduates to become entrepreneurs and K-Workers. MeDC initiated such a program with the purpose of providing skill training in ICT-related areas. The concept of degree ++ practiced by many IPTs in Malaysia is similar to the reverse transfer concept.

If we are very serious about advancing our economy and at the same time reducing unemployment among university graduates, especially, we have to think about promoting TVET at both secondary schools and post-secondary schools. TVET should be emphasized in the development of policy for human capital development because TVET is an important element to both economic growth and to providing economic opportunities for youths.

Improving the Image of TVET

The perception of a second-class status that is unofficially accorded to TVET has to be removed by taking steps such as having an articulation agreement with post secondary institutions. In order to make such an articulation, we need to improve the quality of TVET program. It's entrance requirement must not be comprised. If we can improve the image of TVET, I am sure enrollment in TVET will increase. It was reported in *Education Today Newsletter* April-June 2005, UNESCO, which Korea wanted to make the big push into export-oriented manufacturing, construction and service-oriented sectors, thus, the country needed a new stream of skilled workers. For that purpose, Republic of Korea began to expand its investment in TVET. Today, about 40 per cent of secondary students in Korea are in TVET compared to Malaysia, which is about 10%. With the expansion of TVET, the government of Korea was able satisfy the need for skilled labor.

In Korea, for example, VET students are getting a healthy dose of academic subjects so that they can apply to universities. We should do the same whereby TVET curriculum should also include sciences and mathematics comparable to the subjects in academic schools. Such a measure will of course change the negative perception towards TVET. We want to show TVET is not only for students who are poor in academics. We want to say that TVET is for everybody. If we can make entrance to TVET institutions competitive, only then people will appreciate the value of TVET. Of course, we need to cater students who are poor in academics. For them we have skill stream in TVE secondary schools. TVET in Malaysian secondary schools consists of vocational, technical, and skill streams. Through skill stream, students are trained to acquire technical skills appropriate for the market with the

purpose of producing support staffs who are experts in some areas needed by the industries. For instance, we need people to service mobile phones, computers, and air-conditioning, and bricklayers. Therefore, we need to train people to take up these jobs. I think if we start TVET at much earlier age, at the form one level, we can produce experts, or even innovators in some areas. This is true because those students will be in the lower secondary school for three years and we can achieve a lot within the three years.

We all know that the nature of occupations served by the vocational education sector, though, has been evolving progressively in recent decades into a one demanding of more intellectual and higher-order skills commonly associated with traditional professions. The rise of business, communications, and service industries, and the evolution of economies into knowledge-based societies have transformed vocational education, especially in the more economically developed countries, into a sector more focused on education than on training. With changes occurring in workplace and work environment, we need a well-educated and highly skilled workforce to achieve success and prosperity.

In the last quarter of the 20th century and continuing into this century, there have been considerable changes to the kinds of work available across and within countries. As a result, there were reshaping, transformation, and delineation of some occupations. Not only do works change as indicated by Wilson (2005), the workplace itself is also changing from the production and/or service orientation, common during the Industrial Age, into a knowledge-based and learning enterprise. In addition, Wilson (2005) goes on to say that, the nature of workers is also changing. They are being transformed from operatives performing repetitive, assembly line tasks to knowledge workers in learning organizations. Knowledge workers as defined by Wilson (2001a) are those who use logical-abstract thinking to diagnose problems, research and apply knowledge, propose solutions, and design and implement these solutions, often as team members.

To accommodate the changes that are occurring, education, especially TVET has to make changes in its training program and approaches. Changes that have taken place in many countries such as United States of America (USA), Britain, Australia, Korea, and Malaysia resulted in the changes of TVET. For example, manufacturing works in the USA, Britain, and Australia have declined significantly. However, it has grown significantly in Korea and many other Asian countries. Thus, with such changes happening in economic activities, these countries reshaped their training programs to accommodate the needs for the changing economic activities. Malaysia, for example has stressed on Multimedia Super Corridor (MSC), thus it is logical for Malaysia to increase the number of skilled workers in IT-related occupations. If we are to be the center for automobile industry, as proposed by

the government, then Malaysia has to have a well-trained workforce related to automotive industry. Therefore, our TVET has to change to accommodate the changes in the industries

In many countries, TVET is changing, particularly regarding curriculum and delivery approach. Malaysia, for example is converting some of its technical schools to become vocational schools. TVET curriculum is becoming increasingly industry and market-driven with an emphasis on new technology. In many countries, TVET has removed obsolete subjects that are no longer appropriate for the new economies. It has modernized the equipment and teaching/learning materials and has changed the training approaches. According to Siriwardene & Qureshi (2009) orienting TVET to the needs of the world of work is, therefore, indispensable not only for economic and social development, but also for sustainable development. In line with educating and training knowledge workers for knowledge economy, changes should not be limited to curriculum and approaches only. Changes need to be made to educational policies, facilities, and above all, teachers. As we know, teachers no longer impart knowledge but facilitate learning. A curriculum is no longer a mechanism to deliver facts, but a mechanism to promote and facilitate learning and thinking. Educational facilities, such as classroom must be reoriented to better facilitate learning. More rooms that are designed to facilitate interaction must be designed in lieu of traditional classrooms and lecture halls. Such a reorientation will increase interaction among the participants (Siriwardene & Qureshi, 2009). Latest equipments are needed to ensure students get to train using the latest technology. In view of the immense potential of TVET to generate growth, Siriwardene & Qureshi (2009) pointed out that TVET is emerging as a vital empowering tool for improving living conditions. TVET enhances the capabilities of individual's employability and to obtain decent work and increase their earnings.

The nature of TVET

There is an increasing demand for more high skilled workers across many businesses and industries thus, creating a new interest and enthusiasm for technical and vocational education and training. As a result, we are seeing that TVET institutions are making a strong comeback in many parts of the world. In Malaysia, it was estimated that in 2005, 27% of new entrants into job market were without any kind of skills and by 2020 Malaysia needs 3 million skilled workers. Malaysia needs to ensure that she has a large pool of high skilled workers to meet the aim of becoming a fully industrial country with high-income society. As of 2009, TVET

institutions manage to produce 120000 graduates thus, indicating that a lot more TVET graduates need to be produced. Currently, Malaysia has 405 public skill-training institutes and 584 private skills training institutes. Various ministries are working toward ensuring that Malaysia achieves this objective of having 3 million skilled workers by 2020. These are the Ministry of Human Resources, MARA, Ministry of Youths and Sports, Ministry of Agriculture and Agro-Based Industry, Ministry of Education, Ministry of Higher Education, Ministry of Defense, State agencies, and private sectors.

Today, many high school graduates and students are learning to become computer technicians, chefs, graphic designers, technicians, mechanics, nurses and so forth. It shows youths are becoming interested in TVET. Thus, the government as well as private sectors have made an effort to offer TVET in areas such as IT and computer science, creative arts and designs, fashion and interior design, business and accounting related courses, health care, culinary and tourism, technical courses to meet the aspirations of young school leavers. This is to ensure that the career needs of many high school graduates can be accommodated and their talents are not wasted.

New economy and TVET

Globalization and the intensive use of information and communication technology have led to the emergence of a new economy (Boutin, Chinien, Moratis, and van Baalen, 2009). A division of economic and social affairs, United Nations (2001) defines globalization as a flow between countries of goods, services, capital, ideas, information and people, which produce national cross-border integration of a number of economic, social and cultural activities. The use of information communication technology (ICT) has made possible for the internationalization of core economic activities such as the exportation of some service sectors from one country to another where the labor is cheap or business transactions without the merchant and customers being present at the same place. For example, USA has outsourced many of her businesses to countries like India who has a large pool of skilled workers. Online businesses are growing at a faster rate than anyone can imagine. Online businesses were there in the 1980s also, but then the customers had to call the merchants to place an order. Now it is not the case anymore. Most of the transactions are done online with no single verbal communication between the customer and the merchant.

The new economy, according to Boutin et al. (2009), is a knowledge- and idea-based economy where the keys to job creation and higher standards of living are innovative ideas and technology embedded in services and manufactured products. In the new economy risk, uncertainty, and constant change are not the exception but the main rule of the game. The new economy and globalization have brought changes in organizations. The structure of the organization becomes flattened. Firms downsize and business process re-engineering is widely used. Many organizations subcontract and outsource non-core activities, and create multifunctional project teams. They empower their employees and emphasize workforce flexibility (multi-skilled workers). An extensive use of ICT in business has made all these possible. In an economy that is increasingly based on knowledge, human capital is considered as one of the most important comparative advantages to compete successfully in the global market and knowledge is positioned as a competitive resource (Boutin et al, 2009). Economic prosperity in the global economy depends highly on the ability of a nation to provide a well-educated workforce. Thus, it is the responsibility of the nation to develop, attract, and maintain the workforce required by the new economy.

Every time a business is to be brought to a country, one question that is always asked is whether the country has skillful and well-educated workforce. It is very important as asserted by The Conference Board of Canada (2001) that a country has knowledgeable and skillful employees because they will create value-added products and services, efficiently and effectively, so that businesses can compete successfully in the global market. As such, human resource is the main assets of any country and investment in human resource is the key to the development of a country. It is as important if not more important than investment in capital or other resources for the business to succeed in this globalized world as acknowledged by the UNESCO (1999). In fact, according to Chinien et al. (2009), it is the theme for the development of a national strategy or master plan for TVET in most countries.

In the new economy, we need human resources that have both soft skills and technical skills or work skills and TVET can play an important role in ensuring our workforce are highly skilled and possess the employability skills. Technical knowledge and skill alone has a short life span and job specific, thus may not be transferable to other trades. Each employee has to have the desire to upgrade his or her skills (for example) if he or she is to continue contributing to the progress of the organization. When there was an economic crisis quite recently, many workers lost their jobs entirely through voluntary retirement or forced retirement. The employer retains some, and they however, are required to undergo a retraining to learn new skills and acquire new knowledge. Some may have to change job

entirely by becoming an entrepreneur, for instance. We have heard stories such as a lawyer becoming an entrepreneur in an area not related to his initial training. This is where lifelong learning will have a great impact on the success or failure of such a program and job change.

Malgen & Hopkins (1998) indicate that there is some strong empirical evidence demonstrating that TVET can indeed help to achieve economic growth by improving workers' productivity. As a results of new demand for workforce, nations (for example, USA, European Union, African Union, Middle Eastern countries, Malaysia included) have modernized, or are in the process of modernizing, their education and training system in order to ensure an adequate supply of highly-skilled workers (Boutin et al, 2009). For example, the comprehensive national strategy adopted by Australia, as recommended by UNESCO-ILO, for improving TVET from 2004 to 2010 has captured adequately various worldwide initiatives for re-engineering TVET. The underpinning priorities of the Australian strategy are as follow:

- Increase participation in VET and improve the performance of learners (particularly employed people);
- Improve access to information, guidance, and counseling;
- Raise the image of VET and improve public recognition of its employment outcomes;
- Achieve equality in VET participation and learner attainment;
- Make sustained investment in technical and further education (TAFE) institutions and other registered training institutions;
- Promote partnerships between training providers and industry to drive innovation;
- Implement flexible funding models and planning and accountability approaches;
- Develop sustainable funding and encourage cost sharing;
- Strengthen the industry's role in anticipating skill needs and developing products and services to meet them;
- Improve learning pathways and transition from school to work;
- Improve the quality of VET; and
- Simplify access to international VET markets

(NCRVE, cited in CEDEFOP, 2007)

The importance of TVET

TVET is an indispensable instrument that helps improve the quality of workforce by improving their mobility, adaptability and productivity (Caillods, 1994). The author also stresses that TVET indirectly contributes to the enhancement of firms' competitiveness in the globalized world. This is so because one of the most important features of TVET is its orientation towards the world of work and the emphasis of its curriculum on the acquisition of employable skills. According to Afeti (2006), TVET delivery systems are well placed to train skilled and entrepreneurial workforce that some countries need to create wealth and emerge out of poverty. Some other benefits of TVET include:

1. **TVET improves productivity.**
   With the acquisition of skills, workers are more productive and able to produce more output for a given amount of time and effort. Productivity also depends on the work of team members. Through TVET, they learn to work with one another about doing the job effectively and efficiently. This is true when they undergo on-the-job training.

2. **TVET also contributes to capital-skill complementarities.**
   According to Ashton et al. (2002), a higher level of human capital enables machinery and plants to be used more efficiently, raising the rate of return on investment. According to O'Conner & Lunati (1999), investment in physical capital equipment, is an important determinant of growth. But, it needs a highly skilled worker to master technologies in newly acquired capital equipment.

3. **TVET addresses technological change.**
   According to Booth et al. (1996), the acceleration of changes in technologies prompts the industries to higher highly skilled workers. Without them, it would be difficult to reap most of the returns from technological progress.

4. **TVET also addresses changes in work organization.**
   According to Booth et al. (1996), the demand and effective use of skills within enterprises depend on the ways in which work is organized. The changes of organization and work practices in high performance enterprises have an implication on the skills required of employees. In this type of organization, there are self-managed work teams, multi-skilling, job rotation and cross training and the devolution of decision making (Aston & Sung, 2002). It only

works if employees acquire technical skills in addition to those normally required in a traditional organization (Ashton & Sung, 2002).

5. **TVET addresses trade openness, competition and Foreign Direct Investment (FDI)**
   With globalization, skills, rather than the resource base of the region determine their competitiveness (Shakar, et. Al. 2001). Globalization raises the capital flow, which, in turn, raises the demand for skilled manpower. A lack in highly skilled labor may deter the flow of FDI to that particular country.

The Implementation of TVET

In general, most countries, Malaysia included, implement TVET in three different ways. These are:

1. **School-based TVET**
   a. **Comphensive high/secondary schools**
      Here vocational subjects are offered as elective subjects and students take these subjects according to their interests and aptitudes. In our school system, several vocational subjects (MPV) are offered mainly for those who have no inclination toward academic field. Some vocational subjects are offered also to students who are good academically. They take the subject as an elective.

   b **Vocational and Technical Schools**
      Here vocational education takes place mainly in vocational and technical schools at the secondary level. These institutions run parrellel with academic schools but are focused on TVE. Currently, vocational schools have been changed to a four-year Vocational College.

2. **Non-school-based centers**
   Typically run by ministries and agencies such as MARA, Ministry Youth and Sports, Ministry of Human Resource, Ministry of Higher Education, and state agencies, mainly for youths who have completed secondary education or a part of secondary education. The training can be variable in length, from modular courses to short courses or even lasting one to three years. At the end of the training there will be an award of certificate by the respective institutions.

3. **Within enterprises or in-service training**
   Courses are offered within the enterprise through on-the-job training or apprenticeship scheme. These are tailor-made courses offered by the experts within the enterprise or by people outside the enterprise. The main purpose is to equip or update knowledge or skills required of the workforce to operate new equpments or manage new projects.

Conclusion

TVET is a branch of education that cannot be overlooked by any government. It is through TVET that a nation is able to achieve a desire to become an industrialized nation. Great economies, such as Korea and Japan emphasized on the development of TVET in their education system. High skills acquired by students of great economies form the foundation for their continuous economic development. If Malaysia is to be like other strong economies, we need to believe that TVET can do the job. We need to put more focus on TVET. We need to change the negative perceptions by our society of TVET. We need to encourage more youth to enroll in TVET program. We need employers to recognized TVET qualification. Most important of all is the commitment from all parties involved in the development of country's human resource by making TVET a first choice of education rather than education for the second half of high school graduates.

** This chapter is taken and modified from INAUGRAL LECTURE of Professor Ab Rahim Bakar, 2011 Titled: *Preparing Malaysian Youth for the World of Work: Roles of TVET* published by UPM Press

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CONDUCTING HANDS-ON TASK IN VOCATIONAL EDUCATION : TEACHING METHOD IN AUTOMOTIVE COURSES*

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Abstract

This paper discusses the findings from a study on teaching in practical work on automotive courses at Vocational Colleges in Malaysia. The random sampling technique was used in selecting 283 students and 63 teachers as respondents from the automotive courses. The findings of the research indicate that teachers have strong preference in using the demonstration and questioning technique during the set induction stage of teaching. Teachers also prefer group monitoring and problem solving during the teaching phase, and re-explaining and report writing in the post-teaching stage. This research provides the combination of teaching techniques that could be used in teaching vocational skills in general and automotive practical work in particular. This study has concluded that vocational teaching method in automotive practical work to be applied in teaching for other practical courses to improve current practices. Thus, teachers are proposed to use this method to improve students' knowledge in automotive and to develop skills for the current and future workforce.

Keywords : vocational teaching method, vocational pedagogy, teaching practices.

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Introduction

Learning is a complex process and students often view learning as something done to them by teachers rather than as something they do for themselves. Some view learning as memorizing and about getting things into their head. George (2004) indicates that learning is acquiring facts or procedures that are to be used. It is about learning something so that a learner can do it again when they are asked to, like in an exam. Basically, learning is making sense, about trying to understand things so that a learner can see what is going on. A person who has learned is able to explain things, not just remember them. Learning is useful as it enables a person to perceive the world differently. Thus effective learning is sometimes referred to as personally meaningful learning.

Students learn, with varying degrees of success, through reading, memorizing, thinking, writing, note taking in lectures, observing, listening to and talking with others and by doing things. They may learn in structured situations such as lectures, courses or learning packages; in informal situations, such as browsing through books or on the internet; and through casual conversations with peers. However, the above descriptions of how students learn do not explain how students learn, nor do they account for why students learn. For answers to these questions one has to turn to various perspectives and theories of learning. These may be placed on a continuum with behaviourism at one end and radical humanistic approaches at the other. In between are Gestalt psychology, cognitive psychology, studies of student learning, and constructivist, reflective, and humanist theories. As one moves along the continuum, the theories become less positivistic, less concerned with control and prediction and more ostensibly concerned with social values.

Using the appropriate teaching methods (based on learning theories) is important to facilitate learning, irrespective of disciplines. Learning requires a learner to participate to develop understandings, acquire knowledge, and skills. Practical work in vocational education and training is best suited to achieve the above goals as it requires students to actively participate in completing a task leading to learning. Vocational practical work encourages students to be productive, innovative and enterprising. This involves generating ideas and taking action, as well as developing competencies that satisfy social demands, wants, and opportunity that will extend human capabilities.

Teaching Method In Vocational Education

Teaching method in vocational education must be appropriate to the expected learning outcomes of vocational training that are occupational oriented skills in nature. Thus, vocational students are exposed to learning methods that is focusing on job oriented activities and tasks. Vocational education in summary are a component of educational activity oriented to provide the necessary knowledge and skills to perform a particular job task and also to connect the process of technology transfer, innovation and development (Mohamad et.al, 2014). Vocational students tend to be visual learners where they prefer to learn with pictures, diagrams, flowcharts and demonstrations to understand the learning content better (Mohamad et. al, 2014). Figure 1 illustrates the finding from previous research on the characteristic and attributes of vocational students.

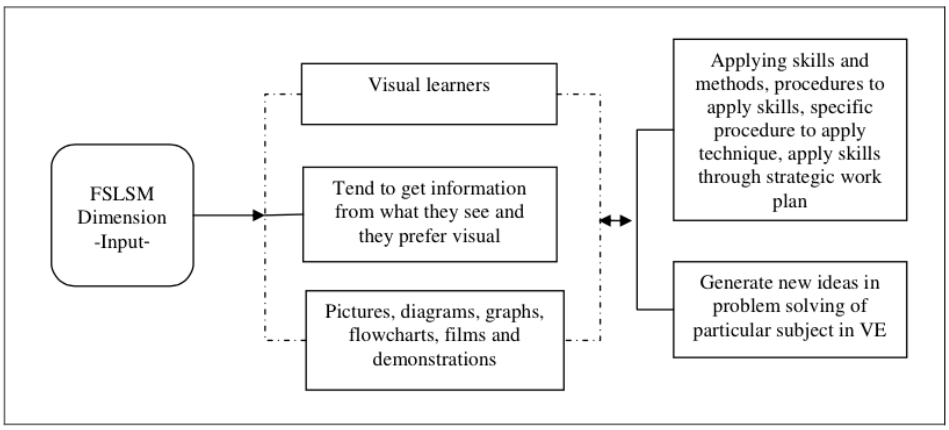


Figure 1 : Vocational students' characteristic and attribute

The instructors in the vocational colleges and indeed many TVET institutions are equipped with the traditional teaching methods including lecture methods, discussion methods, case studies, programmed instructions, role play, demonstration, experiments and educational field trips among others. In lecturing there is too little scope for negotiation and construction of meaning. However, using this method - which are teacher centred - encourages students to be passive rather than active participants in the teaching and learning process. The methods do not help develop important skills such as communication skills, interpersonal skills, persuasive skills, creativity skills, problem solving skills and all other skills that would make them better citizens. The method ignores two very important

domains of learning including psychomotor and the affective domains. This complicates the "walls" already created by the students due to low self -esteem, brought about by negative reinforcements from teachers and parents. Learning by doing is characteristically the way in which vocational pedagogy is described, but such a simplistic understanding obscures the fact that there is no one definitive notion of vocational pedagogy, just as there is no one idealized notion of a TVET teacher (Wheelahan, 2010). In simple form, the basis of TVET teaching can be schematized as the interrelation between three foundational dimensions (Gamble, 2013)

- Formal subject or technical knowledge,
- Pedagogic expertise,
- Practical workplace experience.

There are various justifications for the need to have pedagogic knowledge base of TVET teaching. Often, TVET instructors do not have the necessary theoretical knowledge and expertise to be effective. A range of entry teaching qualifications are described by the sources cited above, ranging from postgraduate teaching qualifications and associate degrees to various levels of certificates and diplomas. However, there is a tendency, especially in certain Anglophone countries, to base mandatory teaching entry requirements on low-level, standards-based qualifications in order to attract industry experts to Vocational Education and Training (VET) teaching. In other countries, the initial entry bar is being raised (Gamble, 2013) based on concern for quality teaching and learning.

Vocational students' characteristic of learning can be illustrated and defined as in Figure 2. Figure 2 is learning process model - the Dale's Cone of Experience - as proposed by Edgar Dale in the 1960s (Dale, 1969). The classifications of learning in VET based on information-processing theory and were conceptualized for the Automotive Vehicle students to include five learned capabilities : cognitive strategies, verbal information, attitudes, intellectual skills, and motor skills. This classification system is related to the assumptions that learning must emphasize the significance of psychomotor domain learning in addition to Bloom's affective and cognitive domains (Sharda et al., 2014; Mohamad, 2013). Sharda et al. (2004) stated that psychomotor levels of learning include perception, simulation, confirmation, production, and mastery of skills that were previously learnt.

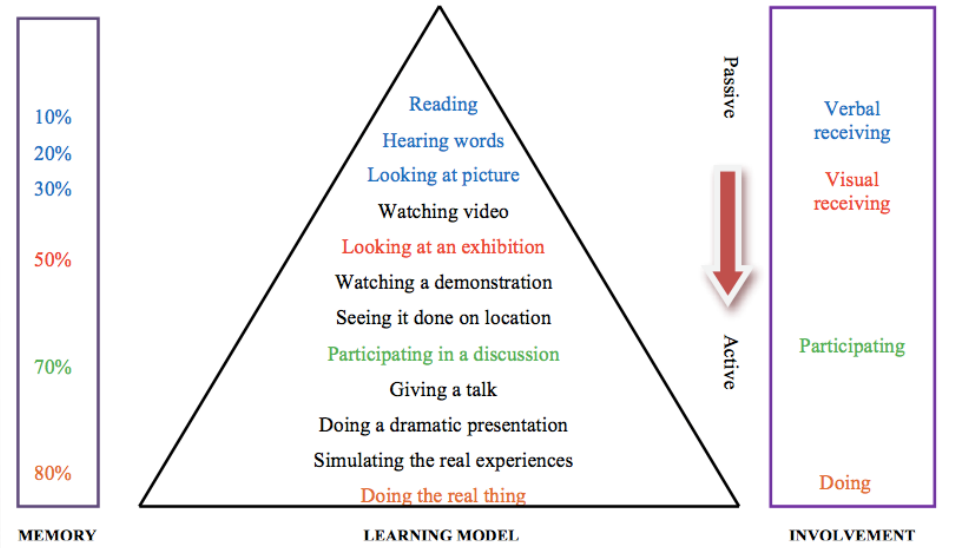


Figure 2 : Learning model and VET student preferences

Students need the learning activity to be aligned with their orientation to learning to better understand the subject content. The suitable learning activities can help an individual to become a good learner. Table 1 shows some common learning activities in classrooms that may help students to understand the learning content effectively (Ahmad, 2012). Learning activities include asking questions, planning, monitoring, checking, revising and self-testing.

Table 1 : Common learning activities

Type	Description
Asking questions	Defining hypotheses, establishing aims and the parameters of task, discovering audience, relating a task to a previous piece of work
Planning	Deciding on tactics and timetables, reduction of task or problem into components, identification of skills or competencies required
Monitoring	A continuous attempt to match effort, answers and discoveries to initial questions or purposes
Checking	Carrying out a preliminary assessment of performance and results at particular stages of an activity
Revising	A review response to assessment involving redrafting or re calculating or the revision of set goals
Self-testing	Final assessment of both results and performance on task

Research Objectives

i) To identify students' preferences in learning automotive practical work based on the teaching and learning phases namely, introduction, body and task conclusion phase of learning.

ii) To investigate teachers' preferences in conducting automotive practical work based on teaching phases namely, introduction, body and task conclusion phase of teaching.

iii) To identify the relationship between teaching preferences in automotive practical work (APW) and learning preferences

A survey was conducted on teachers and students to identify their preferences on conducting teaching and learning sessions in the workshop. To make the objectives of the research relevant, this model was modified to serve the purpose of the research. Competency concept proposed by the Ministry of Education (MOE, 2006) required teachers and students on how APW was conducted. Competency is a statement which describes the integrated demonstration of a cluster of related

knowledge, skills and attitudes that are observable and measurable, necessary to perform a job independently at a prescribed proficiency level (Earnest, 2001).

Research Findings

Learning preferences according to APW stages

Table 2 shows the preferred teaching methods for the introduction stage of a practical class. The highest score, 4.67, is the demonstration method followed by sketching diagrams with an explanation before they do the task with a mean of 4.11. However, students do not prefer using the module (3.10) or video (3.15) while the teacher begins the topic for practical task.

Table 2 : Preferred learning method for the introduction stage of APW (N=283)

Items	Mean	SD	Mean	SD
	Electric Diesel		Automotive Vehicle	
Sketching	4.11	.478	4.13	.470
Demonstration	4.67	.604	4.57	.209
Hands out	3.01	.526	3.07	.436
Video	3.15	.674	3.05	.688
Questioning Technique	3.97	.548	3.86	.518
Use the module	3.10	.285	2.98	.305

Table 3 shows the preferred learning methods for the main part of learning APW in Electric Diesel. Analysis indicates that the method that students prefer is for the teacher to explain the task in small groups with a high mean of (4.12) followed by using module at 3.92 and problem solving at 3.88. Students don't prefer using the teacher guide with a mean of 2.76.

Table 3 : Preferred learning method for the main part of learning stage of APW (N=283)

Items	Mean	SD	Mean	SD
	Electric Diesel		Automotive Vehicle	
Doing together with teachers	3.70	.695	3.77	.604
Tracing the diagram	3.63	.542	3.66	.634
Teachers explain in small groups	4.12	.431	4.16	.362
Discussion among friend in group	3.77	.697	3.79	.777
Questioning Technique	3.56	.769	3.59	.586
Following a teachers' guide	2.76	.690	2.73	.777
Using the module	3.92	.782	3.89	.717
Sketching	3.72	.824	3.72	.874
Problem solving	3.88	.821	3.88	.770

At the end of the class the teacher will draw conclusions as to what students have done and complete the task given. A few methods were identified and based on the result for Electric Diesel, students liking the teacher to re-explain the entire task given and to make conclusions has a mean of 4.36. Table 4 proved what the students' need. Students also prefer the teacher to ask them questions with a mean of 4.13 and to make lab reports with a mean of 4.09.Students also prefer the teachers to end the practical class session with a re-explanation of the task given. Results show that students agree with this method with a mean of 4.54 followed by questioning technique at 4.23 and report writing at 4.12. The lowest mean is quiz at 3.65.

Table 4 : Preferred learning method for the conclusion stage of APW (N=283)

Items	Mean	SD	Mean	SD
	Electric Diesel		Automotive Vehicle	
Teacher re-explain	4.36	.457	4.54	.435
Quiz	3.78	.563	3.65	.609
Short conclusion/summary	3.89	.554	3.76	.404
Questioning Technique	4.13	.624	4.23	.688
Report Writing	4.09	.506	4.12	.433
Comparing among group work	3.56	.675	3.86	.711

Teaching preferences according to APW stages

Table 5 shows the data of teachers' preferences on how to start the introduction session in APW. The highest percentage (95.5%) as shown in Table 5 indicates that demonstration is the most frequent method used by teachers, followed by sketching (84.1%), questioning (81.4%), use the module 79.4%, giving hands out 66.7% and showing video is 63.4%.

Table 5 : Preferred teaching methods used in the introduction stage of APW (N=63)

Method	Percentage (%)		
	Not Agree	Not Sure	Agree
Sketching	1.6	19.0	84.1
Demonstration	0.0	4.5	95.5
Questioning technique	4.8	13.8	81.4
Video	31.7	4.9	63.4
Hands out	28.6	4.7	66.7
Use the module	12.7	3.2	79.4

Table 6 shows the data teachers' preferences during the teaching session (body). For most teachers, a monitoring approach with small groups is an effective method when teaching APW (79.4%) followed by using the module at 84.1% and problem solving approach at 76.2%. The smallest number is that of doing without teachers' guide (4.8%). Teachers are almost in agreement with the three methods when teaching the body of APW.

Table 6 : Preferred teaching methods used in the teaching stage of APW (N=63)

Method	Percentage (%)		
	Not Agree	Not Sure	Agree
Doing together with teachers	39.7	11.1	49.2
Tracing the diagram	36.5	17.5	46.0
Teachers monitor in group	15.9	4.7	79.4
Discussion among friend in group	54.0	11.1	34.9
Questioning technique	76.2	1.6	22.2
Doing without teachers guide	95.2	0.0	4.8
Use the module	12.7	3.2	84.1
Sketching	47.6	20.7	31.7
Problem solving approach	17.5	6.3	76.2

Table 7 presents the methods that teachers use at the end of the teaching session. 90.4% teachers agree that they re-explain the tasks that have been given and how to solve the problem. 84.1% prefer report writing to ensure that students understand what they are doing. A similar number of teachers prefer students to prepare a report while the lowest items preferred by teachers are quizzes and comparing among group work with 42.9% and 39.7% respectively.

Table 7 : Preferred teaching methods used in the conclusion stage of APW (N=63)

Method	Percentage (%)		
	Not Agree	Not Sure	Agree
Teacher re-explains	6.4	3.2	90.4
Quiz	54.0	3.1	42.9
Questioning technique	7.9	19.1	73.0
Report writing	3.2	12.7	84.1
Short conclusion/summary	15.9	4.0	80.1
Comparing among group work	31.7	28.6	39.7

Relationship between the three most preferred teaching methods

The relationship between the three methods data when starting teaching or when giving students a practical task were analysed. Table 8 illustrates the mean score between six methods of teaching introduction in APW. Correlations were analysed to identify the relationship among three teacher preferred teaching methods for the introduction of APW. The analysis presented in Table 4.14 shows that teachers who prefer to use the demonstration method also tend to use the questioning technique with a correlation value of r=.85 which is a strongly positive correlation.

Table 8 : Relationship between demonstration, questioning technique, and sketching

		Demonstration	Questioning Technique	Sketching
Demonstration	Pearson correlations p-value (2-tailed) N	1 . 63	.848(**) .000 63	-.569 (**) .001 63
Questioning Technique	Pearson correlations p-value (2-tailed) N	.848 (**) .000 63	1 . 63	-.477(**) .009 63
Sketching	Pearson correlations p-value (2-tailed) N	-.569(**) .001 63	-.477(**) .009 300	1 . 63

**** Correlation significant at the 0.01 level (2-tailed)**
r=.85 shows strongly positive correlation between demonstration and questions technique
r=-.48 shows weak negative correlation between questions technique and sketching
r=-.56 shows medium negative correlation between demonstration and sketching

There are three methods that teachers prefer to use while teaching APW. They like to monitor in small groups, use the learning module and teach students how to solve the problem. Table 9 presents the data to identify, during teaching activities (body) in automotive practical work, the relationship between the small group monitoring problem solution and the module guide. It shows that teachers prefer to use monitoring in small groups and problem solving approach as the value r=.73 strongly indicates a positive correlation

Table 9 : Relationship between small group monitoring, problem solution, and module

		Demonstration	Questioning Technique	Sketching
Small group monitoring	Pearson correlations p-value (2-tailed) N	1 . 63	.729(*) .000 63	-.379 (**) .001 63
Problem solution (trouble shooting)	Pearson correlations p-value (2-tailed) N	.729 (*) .019 63	1 . 63	-.477(*) .029 63
Module	Pearson correlations p-value (2-tailed) N	-.379(**) .000 63	-.477(*) .019 300	1 . 63

**** Correlation significant at the 0.01 level (2-tailed)**
r=.73 shows strongly positive correlation between small group monitoring and problem solution
r=-.38 shows weak negative correlation between small group and module guide
r=-.48 shows weak negative correlation between module guide and problem solution

Based on mean interpretation, three approaches were the most favoured methods that teachers use to teach conclusion in APW. Inter correlations test was used to identify the relationship. Table 10 presents the correlation analysis to identify the relationship between teacher re-explain and report writing when teaching the conclusion in automotive practical work. The result shows a positive, strong correlation between teacher re-explain and report writing with a value of r=.73.

Table 10 : Relationship between quiz, questioning technique, and task summary

		Demonstration	Questioning Technique	Sketching
Teacher re-explain	Pearson correlations p-value (2-tailed) N	1 . 63	.729(**) .000 63	.634 (**) .001 63
Report writing	Pearson correlations p-value (2-tailed) N	.729 (**) .000 63	1 . 300	.637(**) .009 63
Summarize the task	Pearson correlations p-value (2-tailed) N	.634 (**) .001 63	.637(**) .009 63	1 . 63

**** Correlation significant at the 0.01 level (2-tailed)**

r=.73 positive strong correlation between teacher re-explain and report writing

r=.64 medium positive correlation between teacher re-explain and summarize the task

r=.63 medium positive correlation summarize the task and report writing

Discussion and conclusion

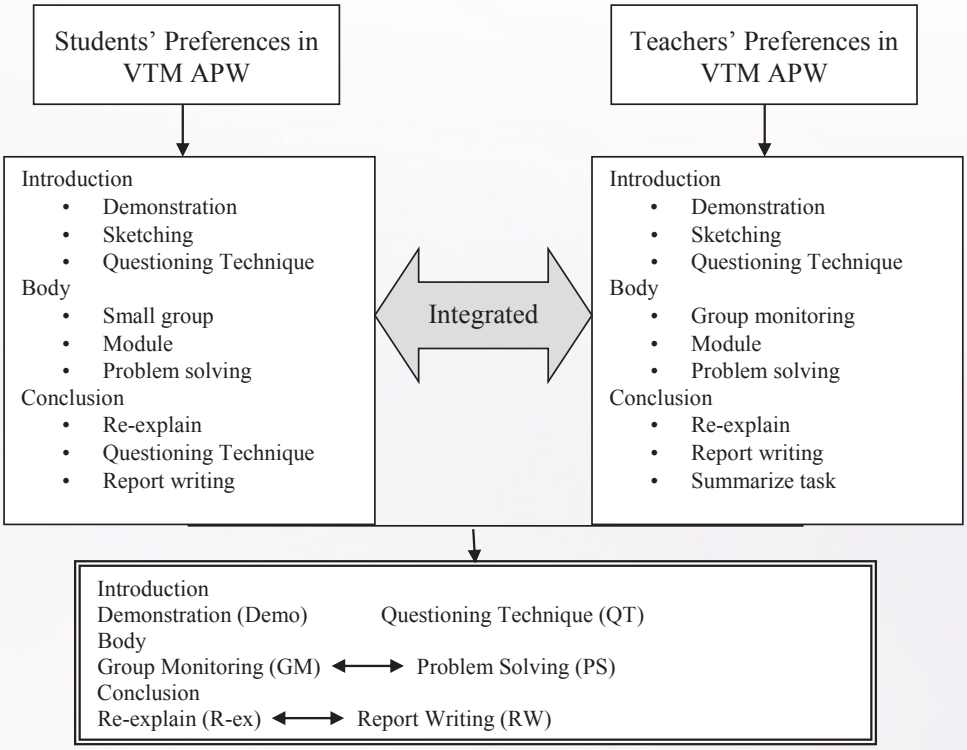
Teachers did not use one single approach in their teaching to make students pay more attention or motivate the learner at the beginning of teaching session. Teachers will use various methods to make teaching more effective (Ahmad et.al, 2013). The previous discussion explained what methods teachers used in each teaching session in APW. For introduction teachers prefer to use demonstration, sketching on whiteboard and questioning technique. These three methods are related to each other and it is this strong relation that makes teachers use them in their teaching. From the research analysis teachers preferred using demonstration with questioning technique during introduction session.

Teachers demonstrated with written procedure followed by oral questioning techniques. Enough emphasis cannot be placed on the important of questioning in any teaching situation. The ability to direct thought-through questioning is recognized as one of the most valid proofs of teaching skill. It will encourage students to take more responsibility for their own learning and enable students to bring their own experiences to new a learning situation. The purpose of questioning during teaching is to help students participate actively during lessons and provides an opportunity for students to express their ideas and thoughts. In introduction session when teachers ask students questions they will sometimes give a wrong answer and teachers are responsible for correcting mistakes and guiding the students in a proper direction. These are delicate moments in teacher-student interactions and deserve to be dealt with carefully.

During body session, the strong relation methods are small group and problem solving. In APW students are divided into small groups to do the task so no wonder teachers preferred the small group approach in the body session of APW. It is easy to monitor and each member of each group has their own responsibilities for the task. Small group is a basic of corporative learning (Galina, 1998) and has been practiced for years. Cooperative learning is the instructional use of small groups so that students work together to maximize their own and each other's learning (Johnson et.al, 1991). At the end of APW teaching the relationship between re-explain and report writing is strong. Teachers prefer to combine these two methods because they will summarize the topic and ask students to explain more details in their report. The report was assumed as evidence for school based assessment and will let the students gain extra knowledge based on the task beyond the curriculum of APW. The students behaviour and psychomotor was measured with

their cognitive ability in terms of preparing reports. Santrock (2001) indicated that behaviour should be explained by experiences that can be directly observed and measured. Teachers observed students during APW teaching session so that they would recognize changes in behaviour during the APW session. Furthermore, teaching and learning process is behaviourist approach on covering subject area to engage the facts and problem solving (Holt et.al, 2000). Figure 3 summarize the research finding.

Figure 3 : Student-teacher preferences in teaching automotive



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MEASURING MALAYSIAN POLYTECHNIC PERFORMANCE USING A BOOTSTRAPPED DATA ENVELOPMENT ANALYSIS MODEL*

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Abstract

The purpose of this article is to investigate the effects of government regulation on higher education, particularly in the Malaysian Polytechnic scenario. The Malaysian government has put a greater attention on developing the polytechnic sector as the main provider of technical and vocational education and training (TVET) in the nation in an effort to achieve the developed nation status by the year 2020. The National Higher Education Strategic Plan (NHESP) which was implemented in 2007 has become the pivotal policy which contributes to the expansion of the polytechnic sector. This study will employ the bootstrapped Data Envelopment Analysis (DEA) model to examine the technical efficiency experiences by members of the polytechnic sector before and after the regulation.

Keywords : bootstrapped, DEA, polytechnic, technical and vocational education and training, technical efficiency.

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Introduction

A nation's economic progress depends on the technical and vocational educational and training (TVET) sector as this sector is seen as being capable of sustaining and developing the nation's workforce supply (Minghat & Yasin, 2010). Subsequently, TVET hopes to enhance the level of knowledge and skill of the nation's human capital. Hence, greater emphasis has been put by Malaysian government towards improving the TVET sector performance. Ministry of Education (MOE) is one of the government ministries which act as one of the TVET provider in Malaysia. Under the jurisdiction of MOE, polytechnics and community colleges are the institutions, which offer TVET in the nation. As such, the author will focus on the performance analysis of the polytechnics which fall under the umbrella of Malaysia's TVET provider.

Currently, there are 24 polytechnics across the country since the establishment of Ungku Omar Polytechnic in 1969 which was funded under the United Nations Development Plan (UNDP) (Hamed, Wahab, Zakaria, & Jasmi, 2010). The Department of Polytechnic Education (DPE) is responsible for generating competent workforce by 2015, a time when it is deemed ready to compete in the international arena. Thus, the polytechnic sector has undergone some fundamental changes since the implementation of the NHESP (National Higher Education Strategic Plan) in 2007. According to Kaur and Sirat (2010), NHESP is considered the key for Malaysia's higher education reform. The direction of the polytechnic transformation is in line with NHESP which is to generate skilful and educated manpower with first class mentality capable to compete in global market.

On the transformation agenda of the Malaysian polytechnic sector, one can observe a very strong policy focus on making the polytechnic to become the leading provider of the nation's TVET sector. The NHESP was formulated with the aim of improving the efficiency by boosting the use of information and communication technology (ICT) and the growth of internationalisation. The largest amount of fund was allocated for the total development budget of the TVET sector during the Tenth Malaysia Plan (2011-2015) according to Izyan, Zainudin, Saud and Nordin, (2012). However, there is no empirical study of the polytechnics' performance before and after the policy reform despite the allocation of huge funding.

There is little documented literature on the performance of the TVET institution sector (Johnes, Bradley & Little, 2012). Thus, this study will provide an analysis on the technical efficiency level using DEA to explore the consequences of policy changes in the polytechnic sector. The use of DEA in this paper employs the same approach used by Johnes (2006a) for assessing the performance of further education institution. Furthermore, the application of bootstrapped procedure by Simar and Wilson (1998) is to provide statistical precision for the nonparametric efficiency measures based on DEA. The application of the proposed model concerns 20 polytechnics across Malaysia and it may be of vital importance for the policy makers and the regulator since this sector consumes huge funding from the government in order to enhance the performance of these institutions.

This study will complement the existing research in four ways :

1) To the best of the authors' knowledge, it appears to be the first paper to utilise DEA on a sample of Malaysia polytechnic institutions to determine the mean efficiency level

2) This study applied the bootstrapping approach to eliminate the drawbacks of DEA which lacks estimates of the uncertainties among the individual efficiencies

3) The application of bootstrapped DEA approach allows the identification of a specific polytechnic campus with respect to resources used (i.e : labour, number of students, qualification awarded) which is performing better than other campuses. The identified campus can also be known as the benchmark campus for other less performing campuses.

4) It investigates the consequences of policy changes, namely the NHESP 2007 on polytechnic education institution using the bootstrapped DEA in Malaysia.

Literature Review

Traditional ways of measuring tertiary education institution performance take various forms of ratio such as return on capital employed, return on total assets and market-to-book-value ratio (Johnes & Johnes, 2004). However, Johnes (2004) also states that the measurement in ratio form is not suitable in this context since it cannot describe the differences in institutional environment and capture the performance of an institution's activities in a long period of time. In addition, Johnes (2008) mentions that the efficiency and productivity studies in tertiary education sector are problematic because of the sector's characteristics : it is a non-profit organisation; it lacks a price mechanism in input and output; and lastly, the sector produces multiple outputs from multiple inputs. Thus, the measurement of tertiary education sector performance cannot be the same as other industries which aims for profit maximisation.

There are numerous studies which used the nonparametric approach in measuring the efficiency of higher education, as well as the efficiency of TVET sector, in the developed countries (e.g. Mills (2004), Johnes (2008), Johnes (2006b), Johnes (2006b), Wolszczak-Derlacz and Parteka (2011), Alexander, Haug, Jaforullah, and Haug (2007), and Johnes et al. (2012)). However, a small number of higher education studies are related to developing countries; for example, Cuenca's study (2011) which focused on the performance of 78 Philippines State Universities and Colleges (SUCs) in the period 2006-2009 and found that the majority of the SUC's are inefficient. The evaluation was done using data envelopment analysis. In a different study of developing countries, Jing and Shen (2011) investigated China's Agriculture Vocational Training (AVET) institution's efficiency; specifically the effectiveness of teaching and management. The result indicates that AVET efficiency depends on the production efficiency changes and the weakened technology growth which affect the education progress's total factor productivity (TFP) caused by the pure technical efficiency. Sunitha and Duraisamy (2010) studied the technical and scale efficiency in higher technical education institution in Kerala, India by comparing engineering and polytechnic institutions. Their results showed better technical efficiency in polytechnic institutions in Kerala.

DEA is suitable to be applied in tertiary education institutions since the production function usually produces multiple outputs from multiple inputs (Banker & Natarajan, 2008). In addition, DEA allows each DMU under the analysis to select its own weight assigned to inputs and outputs, despite using value judgements

on their relative importance. According to Lothgren and Tambour (2010), the absence of price for input and output components in the service sector (in this case polytechnic) shows that this is the best choice of technique for measuring the relative importance of the inputs and outputs. A survey done by Emrouznejad, Parker and Tavares (2008) highlighted that there were more than 4000 research publications as of 2007 which applied DEA techniques in both the industrial and service sectors. According to the survey, education institutions were found to be one of the most popular areas where DEA application was used. To the best of our knowledge, this is the first study to analyse efficiency using the bootstrapped DEA approach in the context of Malaysian polytechnic institutions.

The Data

This study utilises a four-year panel dataset (2006-2010) for analysing the performance of Malaysian polytechnics after the implementation of NHESP. There are 24 main campuses of polytechnics operating in Malaysia and all are taken into account in this study. The data would be collected from each polytechnic's main campus as well as the Department of Research and Development in the Ministry of Higher Education.

A non-parametric DEA model is employed to estimate the institution's efficiency. An important advantage of the DEA approach is that it works well with a small sample size. The small sample size of 20 polytechnics in this paper is not sufficient for parametric (econometric) techniques. There are a number of studies in the literature working also with small sample sizes (e.g. Mills (2004) and Johnes (2008)). Another advantage of the non-parametric approach pertains to its capability to accommodate multiple inputs and outputs.

The important issue in the use of the DEA approach relates to the correct selection of inputs and outputs. However, there is no consensus in the literature as to how the inputs and outputs are specified (Avkiran, 2001). According to Lindsay (1982) as cited from Salleh (2012), some characteristics of the higher education institutions, such as lack of profit motivation, goal diversity and uncertainty, diffused decision making and poorly understood production technology differentiate this sector from other industries and complicate the specification of the variables. Carrington, Coelli, and Rao (2005) also state that it is difficult to accurately define the university inputs and outputs as they are diverse and multi-faceted.

The choice of inputs and outputs in this study is based on the production approach-higher education which combines labour and non-labour factors of production to produce outputs in the form of teaching. This choice of input-output mix in this paper is somewhat similar to study done by Worthington and Lee (2008). The two inputs included in our analysis, which are fully defined in Table 1, are as follows :

Table 1 Input and Output Variable

Variables		Definition of variables
Outputs		
	Undergraduate qualifications awarded	The total number of diploma and certificate qualifications awarded
Inputs		
	Undergraduate enrolments	The total number of diploma and certificate enrolments
	Teaching staff	The number of full-time equivalent academic staff members
	Non-teaching staff	The number of full-time equivalent non-teaching staff members

Two observations are noteworthy at this point. First, student inputs are assumed to be homogenous as there is no easy way to capture the quality. This is consistent with DEA models of previous studies (e.g. Sunitha and Duraisamy (2010)). Second, we mainly focus on teaching as the polytechnics' most important activity since there is little emphasis towards research activities in the polytechnics which makes the institution different from universities.

Methodology

This study on efficiency and productivity changes in Malaysian Polytechnics employed a non-parametric DEA model. The reason for choosing DEA is because the DEA model is capable of accommodating a small sample size as this study only includes 20 polytechnics as the sample study (Sufian, 2007). Therefore, a parametric approach is not appropriate in the case of this study (see Tomkins & Green, 1988; Sinuany-Stern, Mehrez, & Barboy, 1994; Sarafoglou & Haynes, 1996). Secondly, by using the DEA technique, DEA does not require the definition of the production function in the analysis. The third strength is that DEA will have no problems of misspecification in the production function and also the inefficiency distribution since no functional form is specified.

The original DEA, CRS model by Charnes, Cooper and Rhodes (1978) employs the input orientation and assumes the condition of CRS. This CRS assumption is acceptable only when all the DMUs are operating at an optimal scale. In practical circumstances the DMUs may face either economies or diseconomies of scale. It is difficult for DMUs to function at the optimal scale since there are various factors which might contribute to the disability, such as imperfect competition, the regulation of the environment, and financial load. Hence, by using the specification of CRS when the DMUs are not fully operating at the optimal scale, scale efficiency may affect the measurement of technical efficiency.

Therefore Banker, Charnes and Cooper (1984) introduced an extension of the CCR model known as the BCC model, which allows the assumption of VRS and relaxes the CRS assumption in the CCR model. VRS assumption is allowed in the BCC model which will separate pure technical efficiency from scale efficiency. Hence, this study will use the BCC model which allows the VRS assumption since it is not easy to change the scale of the polytechnics' operations in a short term.

Measurement of scale efficiency and the nature of scale economies

To measure the scale efficiency for each DMU in the sample, both CRS and VRS models must be estimated. The technical efficiency score obtained from the CRS model will then be decomposed into two elements : scale inefficiency and pure technical efficiency. According to Cooper, Seiford and Tone (2007) this decomposition is unique because it can be used to represent the basis of

inefficiency either caused by inefficient operation (pure technical efficiency) or by disadvantageous conditions within scale efficiency, or from both sources. If there are differences between the estimated technical efficiency score in the CRS model compared to the estimated technical efficiency score in the VRS model, it can be concluded that the DMU has scale inefficiency. According to Coelli, Rao, O'Donnell and Battese, (2005) the inefficiency in scale efficiency can be defined by Equation (1) below :

$$TE_{CRS} = TE_{VRS} \times SE \qquad (1)$$

Using Equation (1), the scale efficiency for each DMU in the sample can be estimated based on the estimated efficiency in the CRS and VRS model. This analysis will help to recognise the effectiveness of the existing scale of operation in each DMU. Nevertheless, the usefulness of this analysis is limited, since it only demonstrates the existence of scale efficiency but does not suggest the nature of scale economies for the DMU. Hence, in the next stage, as proposed by Coelli et al. (2005), the aim is to run the linear programming problem with the assumption of non-IRS (NIRS). This analysis is conducted by substituting the convexity constraint $N1'\lambda = 1$ with $N1'\lambda \geq 1$. The technical efficiency score at this stage is then compared with the technical efficiency score in the VRS model. If there is a difference between these scores, it can then be concluded that the nature of IRTS condition exists, where the DMU may be too small in its scale of operation. On the other hand, if the non-IRTS technical efficiency score is equal to the technical efficiency score in the VRS model, the DRTS condition exists, where the DMU may be too large in its scale of operation.

Input and output orientation in DEA

DEA model comprises of input orientation and output orientation. The input orientation approach aims to reduce as many of the inputs as possible while the outputs remain unchanged. The output orientation approach aims to expand as much of outputs proportionally as the inputs remain constant. Ultimately, these two approaches differ in terms of the amount to which input and output can be controlled. Both of the approaches obtain the same core of efficiency under the assumption of CRS. However, it is not under the assumption of VRS.

Coelli (1996) demonstrates that both of the approaches' estimate with the same frontier and identify the same efficient DMUs, and the only difference is in

terms of the inefficiency scores of the DMUs. In the context of tertiary education institutions, output orientation is much more appropriate in this sector since the polytechnics may contain a fixed quantity of inputs such as student enrolments (controlled by the government) which are required to generate as many outputs as possible. Major studies in this context have used output orientation in measuring technical efficiency such as Johnes et al. (2012), Flegg, Allen, Field and Thurlow (2004), Joumandy and Ris (2005), Johnes (2006), Agasisti and Johnes (2009), Agasisti (2009), Salleh (2012) and Bradley, Johnes and Little (2010).

The VRS output-oriented is the same as the DEA model input-oriented. The VRS model output-oriented is given as follows :

$$\max_{\emptyset,\lambda} \emptyset,$$

$$st - \emptyset y_i + Y\lambda \geq 0 ,$$

$$x_i - X\lambda \geq 0 ,$$

$$N1'\lambda = 1$$

$$\lambda \geq 0, \qquad (2)$$

Bootstrapped DEA Procedure

Simar (1992) and Simar and Wilson (1998) discovered the use of the bootstrap in frontier models to obtain non-parametric envelopment estimators. The original idea of bootstrapping is to approximate a true sampling distribution by mimicking the data-generation process. This procedure is based on constructing a pseudo-sample and re-solving the DEA model for each Decision Making Unit (DMU) with the new data. A continual repeating process constructs an approximation of the true distribution. According to Simar and Wilson (2000), the DEA scores lack statistical inference since it is a nonparametric approach. Thus, they conclude that bootstrapping is the only available means of statistical test in order to estimate bias, variance and confidence interval.

We will conduct the bootstrapped procedure following the general methodology for the nonparametric approach by Simar and Wilson (2000). The procedure would be conducted using the commands boot.sw98in the FEAR software program (Wilson, 2006).

Result

The empirical findings presented in this section discuss the efficiency analysis of the polytechnics using the bootstrapped DEA with the output orientation under the assumption of VRS. An efficient polytechnic is indicated by the efficiency score equal to unity which is 1. The efficient polytechnics appear on the production possibility boundaries of the period of time. An institution with efficiency estimates below unity indicates inefficiency.

Table 2 provide a general picture of the sector efficiency and productivity performance over the study period. The mean efficiency estimates of the sector are presented annually. The second, third and fourth columns of this table provide the means of efficiency, bias-corrected efficiency and bias estimates of the entire sector, respectively. The fifth and sixth columns present the lower and upper bounds of the 95% confidence intervals for the annual mean efficiency scores.

Table 2 Mean of Efficiency Score of Malaysian Polytechnics Sector for 2006-2010

Polytechnics	Mean of Efficiency	Bias	Bias corrected	Lower Bound	Upper Bound	Bound Width
2006	1.023	-0.015	1.038	1.023	1.069	0.045
2007	1.089	-0.046	1.135	1.092	1.199	0.107
2008	1.081	-0.038	1.119	1.083	1.177	0.095
2009	1.046	-0.026	1.072	1.047	1.112	0.065
2010	1.045	-0.024	1.069	1.046	1.108	0.062
Mean	1.057	-0.030	1.086	1.058	1.133	0.075

Source : Author's calculations

In general, the estimates of technical efficiency using the standard DEA models (presented in the second column) are less than the bias-corrected estimates. Also, in all cases, the estimated means of bias-corrected efficiency lie towards the upper bound of the estimated confidence intervals. These results are consistent with the theory behind the construction of the confidence intervals presented by Simar and Wilson (1998).

In addition, as theoretically expected, Table 2 indicates that the bias estimates for all periods were negative (Simar & Wilson, 2000). As we can see, in most periods the bias mean is small, which indicates the results stability from the models. The bias ranged from -0.015 to -0.046. As a whole, the findings indicate that the sector bias-corrected efficiency level improved during 2007 and slightly declined in 2008. The bias corrected also continued to decline from the year 2008 onwards. The mean efficiency of the sector achieved its peak during the year of NHESP implementation which was 2007.

Tables 3 to 7 deliver more useful findings of estimated efficiency scores for individual polytechnics from 2006 to 2007. The tables present the estimated technical efficiency levels in the second column, the bias estimates in column 3, bias-corrected estimates in column 4, the 95% confidence interval bounds and the confidence interval ranges for the individual polytechnics in the period 2006-2010 in column 5 and the bound width in column 6.

Table 3 Efficiency Score of Malaysian Polytechnics Sector in 2006

Polytechnics	Efficiency	Bias	Bias corrected	Lower Bound	Upper Bound	Bound Width
PUO	1.000	-0.025	1.025	1.001	1.087	0.087
POLISAS	1.000	-0.024	1.024	1.001	1.083	0.082
POLIMAS	1.000	-0.016	1.016	1.001	1.044	0.043
PKB	1.005	-0.013	1.019	1.006	1.048	0.042
PKS	1.052	-0.007	1.060	1.053	1.069	0.016
PPD	1.039	-0.010	1.049	1.040	1.062	0.022
PKK	1.000	-0.024	1.024	1.001	1.085	0.084
PSA	1.044	-0.011	1.055	1.045	1.073	0.028
PJB	1.033	-0.009	1.042	1.034	1.056	0.022
PSP	1.000	-0.011	1.011	1.001	1.026	0.026
PKM	1.000	-0.025	1.025	1.001	1.088	0.087
PKT	1.000	-0.018	1.018	1.001	1.045	0.045
PSMZA	1.015	-0.009	1.024	1.016	1.034	0.018
PMM	1.023	-0.014	1.037	1.024	1.063	0.039
PSAS	1.037	-0.010	1.047	1.038	1.061	0.023
PTSB	1.053	-0.013	1.067	1.054	1.093	0.039
PSIS	1.033	-0.015	1.048	1.034	1.075	0.041
PTSS	1.100	-0.014	1.114	1.101	1.134	0.032
PMS	1.014	-0.013	1.027	1.015	1.058	0.044
PMU	1.000	-0.024	1.024	1.001	1.085	0.084
Mean	**1.023**	**-0.015**	**1.038**	**1.023**	**1.069**	**0.045**

Source : Author calculations

The results suggest that out of 20 institutions, only six polytechnics were ostensibly efficient with the efficiency score = 1. The other polytechnics' efficiency score varied from 1.005 to 1.053.The bias estimated for all institution in the year 2006 showed negative values. The bias corrected for the estimates showed greater than unity for all the polytechnics. The PMU scores of efficiency equal to unity with bias corrected value of 1.024 means that the input could be held constant while the output had been adjusted to be more than 2.4%. The confidence interval of the PMU observation suggests that the output could have been reduced by between 8.5% and -91.6%.

Table 4 Efficiency Score of Malaysian Polytechnics Sector in 2007

Polytechnics	Efficiency	Bias	Bias corrected	Lower Bound	Upper Bound	Bound Width
PUO	1.000	-0.082	1.082	1.003	1.202	0.199
POLISAS	1.183	-0.023	1.206	1.184	1.246	0.062
POLIMAS	1.000	-0.068	1.068	1.003	1.150	0.146
PKB	1.079	-0.043	1.121	1.081	1.186	0.105
PKS	1.111	-0.024	1.135	1.114	1.169	0.055
PPD	1.124	-0.027	1.151	1.128	1.190	0.063
PKK	1.000	-0.071	1.071	1.003	1.148	0.145
PSA	1.090	-0.036	1.126	1.093	1.176	0.083
PJB	1.027	-0.040	1.068	1.030	1.118	0.088
PSP	1.085	-0.042	1.127	1.089	1.180	0.091
PKM	1.000	-0.062	1.062	1.003	1.143	0.140
PKT	1.000	-0.084	1.084	1.003	1.194	0.191
PSMZA	1.097	-0.038	1.135	1.100	1.188	0.088
PMM	1.076	-0.019	1.095	1.078	1.125	0.047
PSAS	1.104	-0.022	1.125	1.107	1.159	0.052
PTSB	1.237	-0.029	1.266	1.240	1.320	0.080
PSIS	1.204	-0.041	1.245	1.206	1.304	0.098
PTSS	1.224	-0.045	1.270	1.226	1.338	0.111
PMS	1.000	-0.082	1.082	1.003	1.198	0.195
PMU	1.145	-0.044	1.189	1.148	1.256	0.107
Mean	**1.089**	**-0.046**	**1.135**	**1.092**	**1.199**	**0.107**

Source : Author calculations

The results for 2007 suggest that, the same amount of institutions are ostensibly efficient with the efficiency score = 1. However, the institutions' score differed from the previous year. The other polytechnics' efficiency scores varied from 1.027 to 1.237.The level of efficiency score variation for the 12 polytechnics which scored more than 1 were higher than the one in the previous year.

The bias estimated for all institution in the year 2007 showed negatives value. The bias corrected for the estimates showed greater than unity for all the polytechnics. For example, regarding the PMS observation, the scores of efficiency equal to unity with the bias corrected value of 1.082 indicate that the output could be more than 8.2% given its inputs. The confidence interval of the PMU observation suggests that the output could have been reduced by between 25.6% and -89.3%. The year 2007 can be considered the benchmark year for the analysis of the results. This is because 2007 was the NHESP policy was implemented in 2007. Further analysis of the coming year can be seen in Table 5 to Table 7.

The results for 2008 indicated that, the amount of institutions which were ostensibly efficient with the efficiency score = 1 was reduced to five institutions from the previous year. The other polytechnics' efficiency score varied from 1.002 to 1.248. The level of efficiency score variation for the 12 polytechnics which scored more than 1 were higher than the previous year. The bias estimated for all institution in the year 2007 showed negatives value. The bias corrected for the estimates showed greater than unity for all of the polytechnics.

Table 5 Efficiency Score of Malaysian Polytechnics Sector in 2008

Polytechnics	Efficiency	Bias	Bias corrected	Lower Bound	Upper Bound	Bound Width
PUO	1.000	-0.073	1.073	1.002	1.194	0.192
POLISAS	1.135	-0.033	1.168	1.137	1.227	0.090
POLIMAS	1.062	-0.027	1.088	1.063	1.139	0.075
PKB	1.000	-0.073	1.073	1.002	1.174	0.171
PKS	1.160	-0.017	1.177	1.162	1.208	0.046
PPD	1.083	-0.019	1.102	1.085	1.134	0.049
PKK	1.017	-0.034	1.051	1.019	1.095	0.076
PSA	1.087	-0.041	1.128	1.089	1.182	0.092
PJB	1.095	-0.025	1.120	1.098	1.161	0.064
PSP	1.000	-0.063	1.063	1.003	1.130	0.127
PKM	1.002	-0.041	1.043	1.003	1.111	0.107
PKT	1.000	-0.073	1.073	1.002	1.192	0.190
PSMZA	1.127	-0.012	1.140	1.129	1.163	0.034
PMM	1.112	-0.014	1.127	1.114	1.155	0.041
PSAS	1.110	-0.014	1.125	1.112	1.148	0.036
PTSB	1.118	-0.015	1.133	1.119	1.159	0.039
PSIS	1.107	-0.031	1.137	1.109	1.183	0.075
PTSS	1.248	-0.031	1.279	1.250	1.343	0.093
PMS	1.000	-0.075	1.075	1.002	1.186	0.184
PMU	1.154	-0.043	1.197	1.155	1.268	0.112
Mean	**1.081**	**-0.038**	**1.119**	**1.083**	**1.177**	**0.095**

Source : Author calculations

Table 6 Efficiency Score of Malaysian Polytechnics Sector in 2009

Polytechnics	Efficiency	Bias	Bias corrected	Lower Bound	Upper Bound	Bound Width
PUO	1.000	-0.048	1.048	1.002	1.135	0.133
POLISAS	1.085	-0.020	1.104	1.086	1.143	0.057
POLIMAS	1.000	-0.037	1.037	1.002	1.094	0.092
PKB	1.000	-0.033	1.033	1.001	1.086	0.085
PKS	1.076	-0.012	1.088	1.077	1.105	0.028
PPD	1.018	-0.022	1.040	1.019	1.071	0.051
PKK	1.000	-0.025	1.025	1.001	1.048	0.047
PSA	1.025	-0.017	1.042	1.026	1.064	0.038
PJB	1.092	-0.011	1.102	1.093	1.117	0.024
PSP	1.000	-0.044	1.044	1.002	1.108	0.107
PKM	1.000	-0.028	1.028	1.002	1.081	0.079
PKT	1.000	-0.048	1.048	1.002	1.132	0.129
PSMZA	1.069	-0.014	1.084	1.071	1.103	0.032
PMM	1.131	-0.015	1.146	1.133	1.164	0.032
PSAS	1.039	-0.011	1.050	1.040	1.066	0.026
PTSB	1.095	-0.014	1.109	1.097	1.130	0.033
PSIS	1.041	-0.018	1.058	1.042	1.079	0.037
PTSS	1.161	-0.031	1.192	1.163	1.235	0.073
PMS	1.000	-0.048	1.048	1.001	1.132	0.131
PMU	1.082	-0.025	1.107	1.084	1.153	0.069
Mean	**1.046**	**-0.026**	**1.072**	**1.047**	**1.112**	**0.065**

Source : Author calculations

Table 7 Efficiency Score of Malaysian Polytechnics Sector in 2010

Polytechnics	Efficiency	Bias	Bias corrected	Lower Bound	Upper Bound	Bound Width
PUO	1.000	-0.047	1.047	1.001	1.142	0.140
POLISAS	1.076	-0.021	1.097	1.077	1.137	0.060
POLIMAS	1.000	-0.035	1.035	1.001	1.078	0.076
PKB	1.043	-0.022	1.065	1.044	1.102	0.059
PKS	1.172	-0.020	1.192	1.174	1.226	0.052
PPD	1.088	-0.011	1.100	1.090	1.113	0.024
PKK	1.000	-0.018	1.018	1.002	1.038	0.036
PSA	1.069	-0.022	1.092	1.071	1.123	0.053
PJB	1.080	-0.009	1.089	1.081	1.102	0.020
PSP	1.035	-0.019	1.054	1.036	1.081	0.045
PKM	1.000	-0.031	1.031	1.001	1.081	0.079
PKT	1.000	-0.046	1.046	1.002	1.139	0.137
PSMZA	1.033	-0.016	1.049	1.034	1.071	0.037
PMM	1.061	-0.009	1.070	1.062	1.082	0.020
PSAS	1.032	-0.010	1.042	1.033	1.054	0.021
PTSB	1.080	-0.013	1.092	1.081	1.107	0.026
PSIS	1.000	-0.017	1.017	1.001	1.035	0.033
PTSS	1.130	-0.026	1.156	1.132	1.206	0.075
PMS	1.000	-0.046	1.046	1.002	1.139	0.137
PMU	1.000	-0.043	1.043	1.001	1.114	0.112
Mean	**1.045**	**-0.024**	**1.069**	**1.046**	**1.108**	**0.062**

Source : Author calculations

The results for 2009 and 2010 indicated that, the amount of institutions which were ostensibly efficient with the efficiency score = 1 increased to eight institutions from the previous year. The other polytechnics' efficiency score varied from 1.025 to 1.161 and 1.032 to 1.172 for the year 2009 and 2020, respectively. The value of bias estimates and bias-corrected followed the same pattern as the one recorded in the previous year of the study.

Conclusion

A non-parametric approach, bootstrapped DEA indices was applied in this study to analyse empirically the score of technical efficiency in Malaysian polytechnic institutions. As for the analysis in technical efficiency, the sector as a whole has undergone improvement in the level of mean efficiency post-NHESP period which was from 2007 onwards. This article is expected to make significant contributions to the literature of efficiency studies, particularly in the TVET sector comprising the 20 polytechnics in Malaysia. The effect of the NHESP on the performance of Malaysian polytechnics over the period of 2006-2010 was investigated. Lastly, to the best of our knowledge, no previous study in Malaysia had employed the bootstrapped DEA method to measure efficiency in the polytechnic institution.

As such, for further research, it is suggested that a similar analysis of DEA is conducted using bootstrap simulation to analyse the Malaysian Polytechnics' performance for the year 2010 onwards, particularly focusing on the effects of the Transformation Program on the polytechnics' performance. Besides, the determinant of efficiency and inefficiency can be determined using regression analysis corresponding to the level of technical efficiency measured.

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THE EFFECT OF FIELD SPECIALIZATION VARIATION ON TECHNOLOGICAL PEDAGOGICAL CONTENT KNOWLEDGE (TPACK) AMONG MALAYSIAN TVET INSTRUCTORS*

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Abstract

Technological Knowledge is directly related to productivity, enhanced performance and service quality. Technology integration in the Technical and Vocational Education and Training (TVET) curriculum is expected due to high application of technical knowledge and technology applications. TPACK is a professional knowledge framework that gives flexibility and provides dynamic strategies to TVET instructors to enhance and therefore improve the teaching and learning process. This study analyzed the impact of Field Specialization variation on the level of knowledge gained. It is found that regardless of the large variation and multiple perspectives of specialization existing among TVET instructors, specialization is not a factor that influenced the level of knowledge gained. Therefore, this study contributes to the understanding that there are other factors that may influence the knowledge gained among Malaysian TVET instructors.

Keywords : TPACK; professional knowledge; specialization; technology integration; technological knowledge.

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Introduction

The level of knowledge gained by instructors is an element used to measure the quality and effectiveness of training provided by TVET institutions (Scheerens, Luyten, & Ravens, 2011). Knowledge contributes to the differences occurred in actions taken and decisions made (Clarke & Hollingsworth, 2002) which was built up from the experiences, belief and the culture around them. According to Coggshall, Behrstock-Sherratt, Drill, Menon, and Cushing (2011), 90% of teachers across different generations view that technology use can assist teaching; however, only half of the teachers felt that technology use in teaching and learning is very effective.

Studies have found that the level of knowledge gained varied from one cohort to another. Shaharom Noordin and Faridah Sapiee (2010) found that physics pre-service teachers had moderate level of knowledge while Yeo Kee Jiar and Siti Sara Abdul Halim (2010) found student teachers' knowledge to be at high level. Others found that the level of knowledge among school teachers was unsatisfactory (Ehlers, 2010; Richards, 2010). Female teachers were reported to dominate good pedagogical knowledge but have difficulty in gaining technology knowledge as compared to male teachers (Low, 1999; Shaharom Noordin & Faridah Sapiee, 2010).

Therefore, in order to address quality problems effectively, a good understanding on the competency level of the cohort studied is required. The variation in the level of knowledge gained by different cohorts leads to a question on what affects the variation. Is field of specialization one of the critical factors? What about other demographical aspects such as age or gender?

Professional Knowledge

In Technical and Vocational Education and Training (TVET), besides the standard teaching and learning professional knowledge, instructors also need to acquire specialized knowledge related to teaching and learning of a particular job title. It covers the concepts behind each theoretical and practical application as well as the knowledge on how to expand existing knowledge to create a new one (Muttaqin, 2007).

The teaching and learning strategy chosen should account for any recent changes and current practices by industry as well as students' knowledge background. In order to stay relevant and competitive with the explosion of knowledge across national boundaries, TVET instructors must acquire multiple specializations, engage in high level of thinking and participate in a transformative learning processes (Mishra, Koehler, & Henriksen, 2011). To do that, a dynamic framework on professional knowledge is needed to enable new knowledge formation and provide flexible teaching strategies. As knowledge evolves rapidly in line with technology advancement, instructors need to manipulate existing knowledge and continuously develop new knowledge (Niess, 2011).

Technology Integration

Technology in education involves the use of digital or analog equipment (Plair, 2010) as well as the use of information and communications technology (ICT) such as animation and simulation software (Khan, 2011) to facilitate teaching and learning process implementation as well as daily tasks. According to Ertmer and Ottenbreit-Leftwich (2010), the new definition of effective teaching is the one that uses relevant ICT resources as a meaningful pedagogical tool to help students understand. Having the capability to integrate technology in teaching and learning will help in delivering effective teaching (Hairani, 2006; Md. Johan Othman & Dinyati Lukman, 2011; Sidhu & Kang, 2010)

Technology used in TVET is divided into two main categories, namely the standard technology and the specific technology. Standard technology refers to analog equipment such as books, chalk, chalkboard, or digital devices such as internet, computer hardware and software as well as digital media (Lux, 2010; Mishra & Koehler, 2006). Specific technology refers to the equipment and machines used specifically to perform a certain job scope (Guthrie, Harris, Simons, & Karmel, 2009). An example of specific technology will be the knowledge on offset printing machine for printing work or how to operate the splicing machine for a fiber optic installation module.

Mordini (2007) in Gupta, Fischer, and Frewer (2011) stated that technology has a social function that is capable of transforming society both through the manipulation of physical or symbolic objects and acculturation. Technology functions as the bridging gap between theory and practical teaching (Eidsheim, 2009). This view is supported by Madden (2012) who found that smart phone usage can improve content delivery and students' focus toward learning. Technology enables

instructors to create transformative learning by applying constructive learning and integrating technology into their teaching. Technology can be applied in the analysis process or in decision-making as well as in enhancing teaching techniques (Means, Padilla, DeBarger, & Bakia, 2009).

Technology is often associated with increased productivity. Similarly in education, technology acts as an enabler to help instructors to perform comprehensive teaching and promote brain-based learning (Knight & Elliott, 2009). Technological application is found effective in increasing student motivation and understanding (Buzan, 2006; Jensen, 2000; Knight & Elliott, 2009).

Technological Pedagogical Content Knowledge (TPACK)

Theories and models on professional knowledge are very broad and had been studied from various perspectives (Ohi, 2007). The nearest to the TVET instructor's profession is the Technological Pedagogical Content Knowledge (TPACK) framework proposed by Mishra and Koehler (2006). TPACK is a specialized knowledge referring to the knowledge and ability to integrate technology based on certain pedagogical strategy to teach a specific content knowledge. It is an expansion of the professional knowledge framework introduced by Shulman (Shulman, 1986, 1987).

According to Shulman (1986), mastering Content Knowledge (CK) alone does not ensure effective teaching. Shulman listed seven fundamental types of knowledge required by each teaching personnel (Shulman, 1987; Tengku Zawawi Tengku Zainal, Ramlee Mustapha, & Abdul Razak Habib, 2009) and Pedagogical Content Knowledge (PCK) is one of them. PCK is a specific knowledge where Content Knowledge is matched with Pedagogical Knowledge (PK) (Shulman, 1987).

Recognizing the role and importance of technology applications in education, Mishra and Koehler (2006, 2008) introduced a conceptual framework on TPACK by adding the technological knowledge elements to the Shulman (1987) PCK framework. This framework was agreed by many other researchers such as Knight and Elliott (2009) and Shin et al. (2009) which states Content Knowledge alone is not enough to help TVET instructors prepare students for the future. TPACK is a framework that allows instructors to carry out the teaching and learning process effectively through technology integration (Sahin, 2011; Schmidt et al., 2010).

Mishra and Koehler (2006) integrated the TK dimension into the PCK model (Shulman, 1987b); they introduced four other new fundamental knowledge dimensions, namely : (a) Technological Knowledge (TK), (b) Technological Pedagogical Knowledge (TPK), (c) Technological Content Knowledge (TCK), and (d) Technological Pedagogical Content Knowledge (TPACK) in addition to the existing three professional knowledge types (PK, CK, and PCK) proposed by Shulman (1987).

TPACK in Teaching and Learning

TPACK provides instructors with strategies to match learning content with specific teaching techniques using appropriate technology (Archambault & Crippen, 2009; Koh, Chai, & Tsai, 2010). As in other professions, the ability to use technology to increase teaching and learning effectiveness is essential and expected (Ertmer & Ottenbreit-Leftwich, 2010). Technology applications in the classroom are now a necessity and accordingly, all instructors are expected to acquire technological knowledge and apply technology integration in the classroom.

Guthrie et al. (2009) reported that the TVET teaching and learning process requires high usage of technology since the syllabuses were designed based on hands-on, conscious creation, and collaborative experience concepts. In addition, rapid technological development, increase in enrollment, and financial constraints had forced TVET institutions to switch to software based applications such as animation and simulation software usage to complete the teaching and learning process (Eidsheim, 2009). With TPACK, instructors are able to re-evaluate the purpose of learning and make students think outside the box (Mishra et al., 2011).

This particular transition is important since the current group of students comes from the "Net-Generation" who are digitally literate and fond of using ICT applications (Pittman, McLaughlin, & Bracey-Sutton, 2008; Short & Reeves, 2009). The so called "Net-generation" was also identified to have short attention span and technology has been identified to have the capability to boost their concentration level in the classroom (Mayes, Calhoun, Bixler, & Zimmerman, 2009). Hence, TPACK could be the bridging tool to reduce the existing digital divide between instructors and students besides improving TVET effectiveness (Jamalludin Harun & Nur Khairul Safrah Jamri, 2010). TPACK also has been identified as an agent of multidisciplinary integration (Francis, 2010).

Coggshall et al. (2011) also reported that teachers from the Y generation cohort (those born between 1977 and 1995) are the most knowledgeable teachers compared to the previous generation due to their high interest in technology. However, the same study showed that the Y Generation teachers still feel hesitant to use technology in their profession. This situation was also detected by other researchers (Johari Hassan & Fazliana Rashida Abdul Rahman, 2011; M. Al-Muz-Zammil & Abd. Muezzam Shah, 2010; Wahid, 2010) who found that although the use of ICT for personal purposes and shared digital literacy among teachers and prospective teachers is high, the rate of use in the learning process, however, is still at a moderate level or lower.

A study conducted in Australia on prospective teachers found the knowledge of technology perception of 345 final year students at two universities in the whole Queensland was still at a low level even though the percentage of computer ownership (99.4%) and access to broadband internet (96.5 %) was high. A similar finding was reported by Ertmer and Ottenbreit-Leftwich (2010) in the U.S. whereby 88% of teachers use technology in administrative work and 93% of them use technology to communicate, but the use of technology in teaching and learning is still low.

One study in Malaysia had also found that although the level of ICT facilities provided was high, the level of ICT use by instructors in teaching and learning was still at a low or moderate level depending on the level of study (Johari Hassan & Fazliana Rashida Abdul Rahman, 2011; Md. Johan Othman & Dinyati Lukman, 2011; Naser Jamil, Leong, & Fong, 2010).

Field of Specialization

Field of specializations in TVET normally was determined based on job titles. Its database keeps on expanding in line with economic growth and technological advancement. According to the Malaysian Standard Classification of Occupations (MASCO), there are ten main groups of occupation classification sub-divided into 4310 occupation codes (Department of Labour, 2008). The National Occupational Skill Standard (NOSS) developed by the Department of Skill Development was clustered into 29 main sectors covering 1310 job titles (Department of Skills Development, 2011). The competency of TVET graduates is assessed based on NOSS and currently available from Level 1 to level 5.

Extant theory and empirical evidence showed that specialization is capable of enhancing knowledge growth (Carnabuci & Bruggeman, 2009) and specialization can be seen either as a property or as a process. Specialization as a property in the technological domain refers to the combination of ideas forming a uniform entity of related knowledge. Alternatively, specialization as a process describes the expansion of knowledge from a related area. Andersson and Ejermo (2008) supported the statement by Carnabuci and Bruggeman and mentioned that knowledge specialization is determined by the technology field or domain of the knowledge itself.

Due to the existing variation and the massive knowledge specialization, an understanding to what extent the variation affects the professional knowledge gained is needed. One needs to know whether field of specialization is one of the critical success factors affecting TVET quality (Bhuasiri, Xaymoungkhoun, Zo, Rho, & Ciganek, 2012; Pittman et al., 2008).

Purpose of Study

The guiding research question which this study explored was : What is the level of knowledge (TPACK) gained by TVET instructor currently and how does TPACK level vary across field of specialization? Therefore, this study attempted to measure the current status of the professional knowledge gained and its variation based on field of specialization for the sample of TVET instructors who are different from previous samples in terms of curriculum, specialization, qualification and the teaching and learning orientation. The findings are expected to enable better understanding of teacher thinking besides providing feedback to TVET instructors on their current performance.

Methodology

An exploratory mixed method study was carried out using survey and interview. The level of professional knowledge gained and the emerging factors that influence instructor knowledge were obtained using questionnaires while in-depth understanding regarding the factors influencing professional knowledge was obtained via semi-structured interview. A total of 300 instructors (220 male and 80 female) from nine TVET institutions were chosen based on random stratified

proportional sampling method. The stratification was made based on specialization cluster and level of instruction namely certificates, diploma or advanced diploma. The survey used was adopted from Lux (2010), Schmidt et al. (2010), Nurhayati (2006) and Siti Atiqah (2008) and then adapted to suit the Malaysian TVET system. It was sectioned into three main aspects namely the demographical information, professional knowledge and the factors influencing professional knowledge. Demographical information included, among others, age, gender, education level and field of specialization.

The field of specialization was studied based on six main clusters offered in the TVET institution studied namely (a) Mechanical and Production (MP), (b) Electrical and Electronics (EE), (c) Civil and Building (CB), (d) Printing (P), (e) Information and Communications Technology (ICT), and (f) Non-metal Construction (NMC). Professional knowledge was measured using 29 questions on a Likert scale using the TPACK model ($\alpha = .93$) covering all seven components of knowledge as proposed by Koehler, Shin, and Mishra (2012). The overall professional knowledge was measured by taking the mean of all seven dimensions as suggested by Lux (2010). Personal and organizational factors were evaluated through 59 questions based on three constructs each ($\alpha = .86$). Content validity and pilot study were carried out to ensure the data obtained are precise and reliable.

In-depth study was conducted using a semi-structured questionnaire on three respondents with teaching experience of more than 20 years from the same specialization area. The interview sessions were recorded, transcribed, and cross checked. The findings of analysis were peer reviewed to confirm the themes identified.

Results And Discussion

Descriptive analysis found that the level of professional knowledge among TVET instructors was at a moderate level ($M = 3.16$, $SD = 0.38$). Even though the difference was not significant ($t(298) = 1.60$, $p = .11$), an analysis done on all seven TPACK domains indicated that male instructors gained higher knowledge compared to female instructors. Field of specialization was not a contributing factor to the variation in professional knowledge level ($F(5,300) = 0.73$, $p = .60$) among TVET instructors in Malaysia.

This information could be used to plan better professional development programs for the TVET instructors. The finding on TPACK level indicated that even though the pedagogical aspect was not emphasized in preparing novice instructors as claimed by Ehlers (2010), the level of professional knowledge among TVET instructors is still acceptable. Consequently, in-depth study needs to be done to investigate why the skill gap among TVET graduates still exists even when the instructor level of knowledge is at an acceptable level. As mentioned by Fitz-Gibbon and Kochan (2000) as well as Scheerens (2000) an effective training program depends on multiple aspects at input, process and output levels.

The knowledge gap existing between genders as report by Shaharom Noordin and Faridah Sapiee (2010) and Coleman, Atkinson, and Thrasher (2011) did not exist in this cohort studied.

From the interview responses, it was gathered that pedagogical aspect was considered less important in TVET teaching and learning by the instructors since the curriculum involves a lot of machine operations and hands- on activities. Technological knowledge both on standard and specific technologies was said to be more important than pedagogical knowledge. Analysis on the sources of knowledge revealed that professional knowledge development is best done through practical activities either via On-Job Training or Off-Job Training. As suggested by Guthrie et al. (2009), respondents to this study also agreed that a good relationship with the related industries enables TVET instructor to expand their knowledge specifically on innovation capability, organizational culture and actual work operations.

Table 1 : One Way ANOVA Analysis

a) Descriptive						
Specialization	N	Mean	Standard Deviation	Standard Error	95% Confidence	
					Lower	Upper
MP	122	3.21	0.42	0.035	3.13	3.27
EE	123	3.13	0.38	0.035	3.06	3.19
CB	6	3.03	0.22	0.16	2.72	3.34
P	5	3.08	0.33	0.17	2.74	3.42
NMC	8	3.12	0.30	0.14	2.85	3.39
ICT	36	3.15	0.35	0.064	3.02	3.27
Total	**300**	**3.16**	**0.385**			

b) ANOVA					
	Sum of Squares Type III	Df	Mean Square	*F*	Sig.
Specialization	0.545	5	0.11	0.73	.60
Error	43.74	294	0.15		
TOTAL	**44.29**	**299**			

Another possible explanation for the result obtained could be the limitation of the data collection method. The fact that 66% (n = 201) of the respondents were aged between 18-35 years might have contributed to the moderate level of TPACK since this later generation is known to be more technology savvy (Becker, Fleming, & Keijsers, 2012). Yang and Chen (2010) also reported that digital technology is capable of reducing the gender knowledge gap.

Areas of specialization used in this study were too narrow and only focused on manufacturing clusters offered in the TVET institutions studied. In addition, the majority of the instructors (N = 242; 80.6%) in this study came from Mechanical and Production (MP) as well as Electrical and Electronics (EE) clusters. Therefore, the result might be influenced by the dominance of EE instructors' TPACK level. As mentioned by Carnabuci and Bruggeman (2009), knowledge specialization in this study only considered specialization as a property and no consideration was made on specialization as a process.

Conclusion

The professional knowledge of TVET instructors was found to be at satisfactory level and therefore eliminated the presumption that low quality of the Malaysian TVET system was caused by low instructor knowledge. The research findings suggested that other factors might influence the professional knowledge of TVET instructors in Malaysia and the variation in specialization field does not influence instructors' capability which was claimed to contribute to low performance of TVET graduates. Further investigation should be carried out to identify what other major factors influence the TPACK level among TVET instructors in Malaysia.

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VOCATIONAL EDUCATION READINESS IN MALAYSIA ON THE USE OF E-PORTFOLIOS*

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Abstract

This study was conducted to identify the readiness of vocational education on the use of e-portfolios in teaching and learning. The sample selected is composed of 60 teachers and 100 students from two Malaysian skills accreditation center, namely the Centre for Instructor and Advanced Skill Training (CIAST) and Industrial Training Institute Kuala Lumpur (ILPKL). Aspects studied are (i) the knowledge and skills of the students and instructors in ICT applications, (ii) facilities for the implementation of e-portfolios and (iii) student and instructors perceptions of printed portfolio transformation to electronic portfolio. The approach used to collect data is through questionnaires instrument. The data collected was analyzed using descriptive statistical analysis using SPSS 15.0 (Statistical Packages for Social Science). Results showed that : (i) students and instructors have high basic ICT skills and knowledge, (ii) facilities for the of E-portfolio implementation skills training is satisfactory and (iii) students and instructors view print portfolio transformation to electronic portfolios in vocational education needs to be done. However, students are not skilled in applying information technology in learning and integrating new information with existing information.

Keywords : Readiness, Vocational Education, E-Portfolio.

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Introduction

Vocational education is education that provides individuals with specific skills for a particular job field. This education is important in creating professional or semi-professional energy to generate income and economic development of a country (Kieffer 2008; Schneider 2008; UNESCO - UNEVOC 2010; Vinh 2010). For example France, Finland, Germany, South Korea and Singapore are not dependent on the results generated by the earth but the people who are knowledgeable, skilled and professional character exhibits in doing a job (Economic Planning Unit, 2010). These goals are achieved due to the existence of a systematic vocational education system and contribute a lot to national development.

Current challenges in vocational education is enhancing the delivery of teaching and learning activities based on ICT (Information Communication and Telecommunication) (Rashid 2006; Jantrakool. 2010; Liaw Yin Huat & Muzafar Mat Yusof, 2011; Neal 2011; Robert 2011; UNESCO -UNEVOC 2010; Vinh 2010). Integration of ICT in vocational education greatly benefits the teachers and students such as : (i) a tool to communicate and disseminate information on-line (Jinnah et al. 2011; Robert 2010), (ii) tools that support and help to improve teaching and learning activities (Ghaznavi et al. 2011; Leask & Meadows 2000), (iii) to motivate and interest students (Neal 2011; Salleh et al. 2011), (iv) creating a learning system that provide greater flexibility (Ahmad Fkrudin Mohamed Yusoff et al. 2011; Govindasamy, 2001). ICT technologies are becoming increasingly important in the development of vocational education in this day and offers great potential in improving the quality of vocational education (Ministry of Human Resources 2008; UNESCO 2008).

Although the integration of ICT in vocational education provides many advantages, its implementation in the teaching and learning process is not an easy thing. The main challenges identified in the integration of ICT in education in Malaysia is the lack of time to prepare teaching materials and lack the skills to master the technology (Ahmad Fkrudin Mohamed Yusoff et al. 2011; Liaw Yin Huat & Muzafar Mat Yusof, 2011; Saud et al. 2010; Radiman & Abdullah 2010; Zurina Yasak et al., 2009). In line with the development of ICT, vocational education system should also be changed over in accordance with the changing times. Change of mind set among teachers and students towards the use of ICT in teaching and learning activities needs to be done. Training institutions should take advantage of existing facilities, so that the programs will be more effective.

In the 10th Malaysia Plan, the main goal in focus is mainstreaming and expanding access, to quality vocational education and improving the competence of graduates in preparation for entering the job market (Economic Planning Unit, 2010). One strategy that has been planned is streamlining vocational education delivery methods. Various concepts in the delivery of teaching and learning that integrate ICT has been introduced in recent times such as e-learning, multimedia aided training and blended learning. E-portfolio is an educational product that use ICT service based on e-learning. It can store all kinds of information in digital form, flexible in nature, can be accessed at anytime and anywhere (DiMarco 2006 : Me & Wen 2011; Montgomery & Wiley 2008; Stefani et al. 2007). E-portfolio is the result of the transformation of a previously written portfolio has long been used in assessing the activities of one's personal activities and one's professional evaluation. The difference is that e-portfolios are easier to use in publishing such information and it can also be used as a learning tool where users can share ideas and information with other users on-line (Bullock & Hawk 2005; Handa et al. 2011; Kilbane & Milman 2005).

In skills education in Malaysia, the portfolio is used as a document to evaluate the level of knowledge and performance of students. Its use is still in the traditional paper-based where it is limited for artefact storage alone. According to the Ministry of Education (2011) improving the current delivery of vocational education, should be done by expanding the on-line implementation. The use of e-portfolios in teaching and learning has become very popular at all academic levels. Using the latest technology, the E-portfolio has outperformed traditional paperbased portfolio format and provide the better means for information retention (Bhattacharya & Hartnett 2007; Hallam et al. 2010; Halstead & Sutherland 2006; McAllister & Hauville 2010; Montgomery & Wiley 2008; Siti Fatimah Mohd Yasin 2007; Smyth et al. 2010). The information that can be put into the e-portfolio includes personal artefacts, biodata, lesson plans, assignments, video clips, notes, assessments and the results of work performed (Barrett 2010; Galatis et al., 2009; Gibson & Barrett 2002 Powers et al., 2001; Sweat-Guy & More Buzzetto- 2007).

Seeing the potential of e-portfolios in teaching and learning, it is desirable to be applied to replace the existing written portfolio in vocational education in Malaysia. However, the use of e-portfolio for sure will provide challenges in its implementation. Among the challenges to be faced is the need to provide appropriate infrastructure, to ensure that such information can be sent and accessed properly (Ahmad Fkrudin Mohamed Yusoff et al. 2011; Radiman & Abdullah 2010; UNESCO 2008; Zurina Yasak et al., 2009) and must be skilled and knowledgeable

to use ICT in teaching and learning. (Ahmad Fkrudin Mohamed Yusoff et al. 2011; Liaw Yin Huat & Muzafar Mat Yusof, 2011; Radiman & Abdullah 2010; UNESCO 2008; Zurina Yasak et al., 2009). In the implementation of e-portfolios in vocational education in Malaysia, the three aspects which are knowledge, skills and infrastructures need to be taken into account.

1.1 Research Questions

1. What is the level of knowledge and skills of vocational instructor on the application of ICT?

2. What is the level of knowledge and skills of vocational student on the application of ICT?

3. How current facility for the implementation of e-portfolios in vocational education?

4. How perception instructors and students about the transformation paper based to electronic portfolios in vocational education?

Methodology

Vocational Descriptive research using questionnaires as research instruments were used in conducting this study. Descriptive study is selected as the its characteristics cover the whole issues or problems, fast data collection, the use of large sample sizes, the information collected directly from respondents in a short time and the results of this study can be generalized to a population study (Check & Schutt 2012; Cohan et al 2011). Even the questionnaire was able to measure the variables to be measured from a large sample size with high precision and a small sampling error (Kumar 2011). A total of 100 students and 60 teachers from two educational institutions namely CIAST and ILPKL have been involved as a sample in this study. For the purpose of getting high validity and reliability, the setting of study sample number is based on sample size determination schedule by Krejie and Morgan (1970). This study used questionnaires in the form of five-point Likert scale (1 = strongly agree, 5 = strongly Disagree) and to collect data in this study, the researchers have distributed on their own the set of questionnaires to the teachers and students.

Through this method, researchers are able to explain to the respondents methods to answer the survey form. The research instrument adoption from ICT competence questionnaire Eberhardy (2009). This instrument comprised 4 sections. Section A relating to knowledge in ICT, section B measuring skill usage in ICT and section C measuring ICT facility for the implementation of eportfolios. Finally, section D measuring perception about the transformation paper based to electronic portfolios in vocational education. The face validation for items in the research instrument was carried out by three academic staff from National University of Malaysia that is in the measurement and evaluation discipline.

The level of reliability of the questionnaires was obtained by conducting a pilot study before implementing the actual study. The pilot study was conducted on 20 teachers and 20 students that were not part of the study sample. Data from 40 samples analyzed using SPSS through Reliability-Scale Analysis of Cronbach Alpha. According to Numally (1978), the alpha value of 0.70 to 0. 90 is an acceptable range of values that enable the instrument to be used in the research. Overall Cronbach Alpha values obtained for each item is 0.8 to 0.9, this means that the instruments used are valid and appropriate. The data obtained were analyzed using the Statistical Package for the Social Sciences (SPSS) version 15.0 for the percentage and mean value.

Findings

Vocational Student Level of Knowledge and Skills on the Application of ICT.

Overall mean scores of knowledge level of vocational students in CIAST and ILPKL against the application of information and communication technology is high. This is evidenced by the results of the analysis in Table 1. The result showed that the students are able to : choose to use quality information during the learning process, identify information with the nature of facts and views, evaluate the information obtained critically and efficiently and make an assessment of the newly discovered information. Students are also seen practicing good behavior (ethics) in relation to the use of information technology.Through the display of Table 1, it also shows that the level of knowledge of vocational students in CIAST and ILPKL against the application of information and communication technology is high. Students are proficient in finding information electronically and they are more skilled in finding information electronically compared to manual. Students also

viewed that information technology courses had guided them in producing quality information. However, it had been found that the proficiency level of students in applied information technology in learning and integrate new information with existing information in the learning process is still at an average.

Table 1 : analysis of the mean scores of knowledge and skills of vocational students on the application of information and communication technology.

No.	Item	CIAST			ILPKL		
		Mean	S/D	P/L	Mean	S/D	P/L
	Knowledge						
1	Are able to choose to use quality information during the learning process.	3.8	0.8	High	3.8	0.7	High
2	Are able to identify information with the nature of facts and views	3.9	0.8	High	3.8	0.6	High
3	Practicing good behavior (ethics) in relation to the use of information technology.	4.0	0.8	High	3.9	0.6	High
4	Able to evaluate the information obtained critically and efficiently.	3.9	0.7	High	3.5	0.6	High
5	Able to make an assessment of the newly discovered information.	3.9	0.8	High	3.5	0.8	High
	Average	**3.9**	**0.8**	**High**	**3.7**	**0.7**	**High**
	Skill						
1	Skilled in finding information electronically. (Eg : web sites and database)	4.0	1.0	High	3.7	0.8	High
2	Have enough skills to apply information technology in learning	3.2	0.8	Moderate	3.3	0.8	Moderate

No.	Item	CIAST			ILPKL		
		Mean	S/D	P/L	Mean	S/D	P/L
3	Information technology skills courses that I had attended guide me to produce quality information.	3.9	0.7	High	4.0	0.7	High
4	More skillful in finding information electronically than manually.	4.0	0.9	High	3.5	0.9	High
5	Skilled in integrating new information with existing information in the learning process.	3.1	0.7	Moderate	3.2	0.9	Moderate
Average		**3.6**	**0.8**	**High**	**3.5**	**0.8**	**High**

S/D=standard deviation P/L=proficiency level n=100

The Knowledge and Skills of Vocational Teachers on The Application of ICT.

Table 2 shows the results of the analysis of the vocational instructor level of knowledge on the application of information and communication technology. Overall mean scores of knowledge level vocational instructor at CIAST and ILPKL is high. The analysis showed levels of knowledge of instructor to : choose to use quality information during the learning process, identifying information that has the nature of viewpoint and fact, evaluate critically and efficiently the information obtained, evaluation of newly discovered information and practice good behavior (ethics) in relation to the use of information technology is high.

Table 2 : analysis of the mean scores of the level of knowledge and skills of vocational instructor against the application of information and communication technology

No.	Item	CIAST			ILPKL		
		Mean	S/D	P/L	Mean	S/D	P/L
Knowledge							
1	Are able to choose to use quality information during the learning process.	3.9	0.5	High	4.0	0.4	High
2	Are able to identify information with the nature of facts and views	4.0	0.5	High	4.0	0.4	High
3	Practicing good behavior (ethics) in relation to the use of information technology.	4.2	0.5	High	4.2	0.5	High
4	Able to evaluate the information obtained critically and efficiently.	3.8	0.7	High	3.9	0.5	High
5	Able to make an assessment of the newly discovered information.	3.9	0.6	High	4.0	0.6	High
Average		**4.0**	**0.6**	**High**	**4.0**	**0.5**	**High**
Skill							
1	Skilled in finding information electronically. (Eg : web sites and database)	4.0	0.6	High	3.9	0.7	High
2	Have enough skills to apply information technology in learning	3.9	0.7	High	3.6	0.7	High
3	Information technology skills courses that I had attended guide me to produce quality information.	4.2	0.6	High	4.3	0.7	High

No.	Item	CIAST			ILPKL		
		Mean	S/D	P/L	Mean	S/D	P/L
4	More skillful in finding information electronically than manually.	4.0	0.7	High	3.8	0.7	High
5	Skilled in integrating new information with existing information in the learning process.	3.7	0.6	High	3.6	0.7	High
Average		**4.0**	**0.6**	**High**	**3.8**	**0.7**	**High**

S/D=standard deviation P/L=proficiency level n=60

Further analysis of the overall mean score of the skill levels of vocational instructors in CIAST and ILPKL is also high. The result of the analysis shows that the instructor skills in searching for information electronically, applying information technology in teaching and integrating new information with the existing information in the teaching process are high. The instructors also viewed that information technology skills course have guided them in producing quality information.

Facilities

Facility analysis for the implementation of e-portfolios in education skills are seen from two points of views which is the instructors' view (Table 3) and the views of students (Table 4). Based on Table 3 instructors in both the training institutions (ILPKL and CIAST) expressed in their workplace has internet facilities (100 percent) and convenience of the internet at work is satisfactory (80 per cent). Next most of the instructors in both training institutions have internet access at home (88 percent). In terms of frequency of internet access in the two training institutions, instructors are seen more frequently access the internet at home (67.5 percent) than work (32.5 percent). In terms of computer facilities are almost all teachers having personal computers (96.5 percent) and personal computers have internet access networks (91.5 percent).

Table 3 : Analysis of percentage of facility for the implementation of e-portfolios in skills education from the point of view of instructors.

No.	Item	Frequency Percentage (%)					
		CIAST		ILPKL		Average	
		Yes	No	Yes	No	Yes	No
1	Have internet access at work	100	0	100	0	100	0
2	Internet access at work is satisfactory	90	10	70	30	80	20
3	Have internet access at home	93	7	83	17	88	12
4	Accessing the internet more often at home	70	30	65	35	67.5	32.5
5	Accessing the internet more often at work	30	70	35	65	32.5	67.5
6	Own a personal computer	100	0	93	7	96.5	3.5
7	Personal computers have internet access networks	93	7	90	10	91.5	8.5

n=60

Table 4 : Analysis of the percentage of facilities for the implementation of e-portfolios in skills education from the point of view of students

No.	Item	Frequency Percentage (%)					
		CIAST		ILPKL		Average	
		Yes	No	Yes	No	Yes	No
1	Have internet access at an educational institution	100	0	100	0	100	0
2	Internet facilities in education institutions is satisfactory	70	30	64	36	67	33
3	Have internet access at home	72	28	70	30	71	29
4	Accessing the internet more often at home	70	30	60	40	65	35
5	Accessing the internet more often at education institutions	30	70	40	60	35	65
6	Own a personal computer	92	8	70	30	81	19
7	Personal computers have internet access networks	84	16	62	38	73	27

n=100

Table 4 shows the results of analysis of the percentage of facilities for the implementation of e-portfolios in skills education from the point of view of the student. Students in both training institutions view that their learning institutions possess internet facilities (100 percent) and 67 percent said internet facilities in educational institutions are satisfactory. The results of the analysis also found that nearly 71 percent of students from the two training institutions have internet access at home. In terms of frequency of internet access, 65 percent of students from the two training institutions are seen more frequently access the internet at home compared to 35 percent of the institutions. The next 81 percent of the students found in possession of a personal computer and personal computer having internet access network (73 percent).

Printed portfolio transformation to an electronic portfolio.

Analysis of the percentage of printed portfolio transformation to electronic portfolios in vocational education is described in Table 5. Results show that 63 percent of instructors and 76 percent of students agreed that the existing printed portfolio used in the skills education need to be transformed to an electronic portfolio.

Table 5 : Analysis of percentage of instructors and students view the two skills institutions printed portfolio to the transformation to electronic portfolios in vocational education.

No.	Item	Frequency Percentage (%)			
		Instructor (n=60)		Student (n=100)	
		Yes	No	Yes	No
1	Existing printed portfolio (certificate portfolio / Malaysian skills diploma) needs to be transformed to electronic portfolios.	63	37	76	24

Discussion

The findings from the aspects of knowledge that the students and instructors are able to choose quality information to be used during the learning process, identify information with the nature of facts and views, evaluate the information obtained critically and efficiently and make an assessment of the newly discovered information. The students and instructors were also seen practicing good behavior (ethics) in relation to the use of information technology. Livingstone (2012) states in the application of ICT in teaching and learning, knowledge and skills are of key importance. This is because without the knowledge and techniques in the search of information resources, information literacy cannot be applied in teaching and learning. Educators and students have to turn to ICT, particularly the internet to enable them to become independent thinkers and effective decision makers (Quigley 2011).

Thus the need for knowledge of information literacy is critical and should be looked into seriously. This is because the reliability and validity of the information sought through the internet will not be known just by looking at the information. Knowledge of ICT is very important, especially for teachers and students because without a good knowledge, it will be a constraint in implementing information literacy in teaching and learning. From the aspect of skill, skilled vocational students find information electronically and they are more skilled in searching information electronically compared to manually doing it.

However, students lack the skills to apply information technology and integrating new information with existing information in the learning process. Instructors are not troubled in mastering information and communication technology skills. Overall, the instructors are skilled in finding information electronically, to apply information technology in teaching and integrating new information with existing information in the teaching process. According to Hashim et al (2010) information and communication technology skills are very important. Graduates in the 21st century, which do not have the skills to access, select, evaluate, use and manage information using the latest technology will give a negative impact after studying and also while in the workplace. Tomei (2010) explained that the lack of ICT skills will cause the students to not being able to do their research well due to their inability to find the required information. Skills to be learned and owned by lecturers and students in the implementation of teaching and learning are the skills to get the information, skills to compile all the various information and the skills to use information technology (Kim et al. 2012; Romeo et al. 2012; Somekh 2007).

Facilities for the implementation of e-portfolios in skills education in Malaysia are good. Skills training institutions are seen to have internet access and internet facilities provided are good. Al-Khasawneh et al. (2013) reported that the use of the internet has contributed to education, such as providing the opportunity to improve quality and provide the opportunity to study in a broader context. Peters (2009) noted that the progress of the internet has brought positive changes to the way teachers teach, students learn and communicate. Internet revolution does not only find information globally, it even forges closer ties between human to communicate. Next most of the students and instructors have internet access at home, possess a personal computer and personal computer have internet access network. In terms of frequency of internet access students and instructors are seen more frequently to access the internet at home than in educational institutions and workplaces. This may be due to the relatively limited time constraints in the workplace and educational institutions. The findings showed no constraints arising in the implementation of e-portfolios in vocational education in Malaysia in terms of access to facilities. Computers and the internet are very important in the implementation of eportfolios to enable students to manage information and learn on the go and at the time of their choosing. This allows students to manage their own time effectively. Students also have the opportunity to get experience talking with teachers and peers and experts in getting views on any matter.

Next on the whole student and instructor agree printed portfolio transformation to electronic portfolios in vocational education needs to be done. Students and instructors of vocational education in Malaysia agree printed portfolio transformation to electronic portfolio needs to be done. The use of a printed portfolio is not relevant to be applied in vocational education at present. This is because the printed portfolio is static, limited in sharing information with others, process management, evaluation and updating the material are difficult and cannot improve the professional skills (McAllister & Hauville 2010; Smyth et al. 2011; Stefani et al. 2007). On the contrary, electronic portfolio has many advantages over the printed portfolio, which are being able to save and organize material more easily, share information, enhance professional skills, increase graduates' generic skills and facilitate the search for information (Bhattacharya & Hartnett 2007; Halstead & Sutherland 2006; McAllister & Hauville 2010; Smyth et al. 2011).

Conclusions

Overall, it can be concluded that the use of e-portfolios in vocational education in Malaysia can be done. This is because instructors and students have the basic knowledge and skills in ICT. Training institutions also have enough facilities to apply the e-portfolio. Instructors and students also viewed that printed portfolio transformation to electronic portfolios in vocational education needs to be done. However, students are not skilled in applying information technology in learning and integrating new information with existing information. Therefore, students should be given more exposure to the application of ICT in learning. Among the proposals to improve their skills for the implementation of the use of e-portfolios in vocational education are : (i) the need to provide training on the use of ICT skills, (ii) encouraging lecturers to produce innovative teaching methods and with high technology, (iii) the administrator should make changes to the curriculum, especially subjects related to computer literacy, and (iv) improving ICT infrastructure. Courses in information technology are a must because of its use are able to increase the students' knowledge and skills.

Information technology is undergoing a technological revolution that is very fast. This is because the technology has become a media medium to deliver information and communication, especially in teaching and learning in this cyber era. If the student refuses and did not follow any course on information technology, they are not likely to know how to use the latest information technology tools. Therefore, vocational education institutions in Malaysia must pursue the rapid current changes so that the teaching and learning process would be more relevant in line with the latest developments. The findings of this study have an impact on the implementation of the eportfolio in vocational education in Malaysia.

Mastery of basic knowledge and skill in ICT and adequate facility showed no problems to implement e-portfolios in vocational education in Malaysia. It is a step that can be done with the transformation of vocational education in Malaysia, towards streamlining the delivery method and enhances organizational capacity in producing human resources, characterized by K-workers in a knowledge-based economy era. Efforts to improve the quality of teaching and learning should be done in earnest to create excellent training institutions, which are able to produce graduates who have the skills, and globally competitive in employability.

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THE NEED IN TRAINING AND RETRAINING FOR TVET TEACHERS IN MALAYSIA*

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Abstract

Malaysia is a fast developing country and to support the growth of Malaysia industrial sector Malaysia needs highly skilled workforce. To fulfill this needs Malaysia has developed many vocational and technical training institutes. Currently there are approximately 194 technical-vocational institutions and there is a plan to increase this number during five next year plan. They are 90 technical schools which provide the vocational course in secondary school level. The Technical and Vocational Education (TVE) in Malaysia started with the enforcement of Razak Report 1956 and Education Ordinance 1957. Other education reports and education memorandum such as Rahman Talib Report and Education Act 1961, Mahathir Report 1979, Cabinet Memorandum 1995, 1998 and 1999 had further sustained the policies, system, curriculum and direction of technical and vocational education. Although the theoretical debate continues, it has been generally that curriculum should be seen as an overall plan for instruction. It consists of a statement of aims and objectives of content in terms of theoretical knowledge, practical skills to be required, attitude towards work and necessary support materials to be used in its presentation. Improving curriculum content has long been regarded as a core-component of TVET. To produce the good quality of TVET in the school level the focus is the teachers those who specialized in their field. Many of teaching staff who were employed possessed necessary technical skills but no had more opportunity to undertake professional training. TVE in Malaysia, there is a shortage of qualified technical and vocational teachers. Most teachers are recruited directly after they graduated from universities and collages based on their academic qualifications and do not have industrial work experience. At the same time qualified personnel with work experience are not willing to become teachers due to the unattractive salary scheme.

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This paper is a review of the structure and performance of the TVE teachers in Malaysia. It is consists in development of curriculum, program design, the nature of learning materials and stakeholders involvement. Teacher training in TVE can be defined is the main role in providing the skill to fulfill the school level TVE needs. Retraining is defined as upgrading of existing skill or acquiring a new one. Upgrading skills can be by accelerating - by doing and joining program in other TVET institution or center. The performance of teacher in TVE is important to make the Technical School in Malaysia is the selected school for parents to send their children and choose the TVE field as a carrier path. This paper is a discussion the issues in training and retraining needs, strategies introduced to overcome the teaching staff as well as curriculum relevancy. Improving the quality of teachers in TVET is related to raising the quality of technical and vocational education.

Keywords: Training, Retraining.

Introduction

Schools offer teachers a good deal more than only the task of preparing students for the world of work. The attention being given to the teacher quality by media, policymakers and researchers is high and debates about teachers have been intense, creating numerous policy decisions at local, state and national levels. However, improving teacher quality and teacher preparation is no simple task. In Malaysia teachers was trained in universities and teacher's training institutions. For TVE teachers a few universities and teacher's training institutions provided the courses which can fulfil the schools needs. At 1990's had one of the teacher's training institutions was the specialist training centres for TVE teachers offered the vocational courses purposely to fulfil the vocational school needs. A few universities provide the courses for technical teachers in terms of technical schools needs. All the graduates either from the teacher training institutions or universities they have qualification and abilities to teach in the technical & vocational schools in Malaysia. The discussion in this paper is that the training that they have did will provide the best performance for TVE in school system in Malaysia? Is that the Curriculum development, program design, the nature of learning materials and stakeholders involvement are the another factors should teachers know and improve. For teachers who had five, ten or more experience in teaching need the retraining to make their knowledge relevance in what market needs? General or vocational education? This is a "tough choice" in many developing countries

(Yang, 1998). In the human capital framework, general education creates 'general human capital' and vocational and technical education 'specific human capital' (Becker, 1964). The former is portable across one's life and from job to job, while the later one is not and hence many advocate general education, as more suitable to the flexible labour force that can change task and even the type of work; but the later one has an advantage, imbibing specific job-relevant skills, that can make the worker more readily suitable for a given job and would make him/her thus more productive. Hence both are important, and education systems in many countries therefore include both general and vocational streams of education in varying proportions.

Training for TVE Teachers

Teacher training in TVE can be defined is the main role in providing the skill. Training is concerned with the development of knowledge and skills to be used immediately or in the very near future and deals with developing people who already have or who are just about to enter a job (Micheal D.T & Diane R.L,2008). Carter and Gribble (1994) said in a nutshell, vocational education and training is learning activity which can contributes to successful economic performance and tangible economic and social gains. It is this focus on tangible outcomes an accountability which broadly distinguishes them from general vocational and education system and services. As stated, in Malaysia teachers training was conducted by a few universities and teacher's training institutions. 1980s and 1990s Technical Teacher's Training College was one of the training centres provide the vocational courses for vocational schools in Malaysia. The courses offered such as Automotive, Building Constructions, Welding and Electric & Electronics. Each of the trainees should complete their training within one and half years to three years it is depends on their basic qualification. Within the training duration they should attend the industrial training for 6 month to have knowledge and skills in their fields. The strength of this experience or we can call situated learning in a particular setting such as the workplace is that learning occurs where the problems to be solved are real or live. They were located in selected industries and will supervise by the person in charge there. Lecturers will come to observe two or three time to make sure trainees will follow the college and industries rules. Trainees learned a lot in this training. They will have extra knowledge and skills for the preparation when they will be a teacher soon. After they finished their training in colleges the will award the certificate and diploma

as a teaching license. But when the government policy had changed and a few improvements have done to have more high quality of teachers especially in TVE. The focus to produce teachers are more to technical field which is not skill oriented. Universities provide the degree course for TVE teachers. When they complete their study they will graduate as another student in other courses but they will teach technical & vocational subject in technical or academic schools. The different of two types of training, teachers graduated from training colleges are more focus in their skills. Teachers from universities are more knowledge in terms of science & technology. What all the teachers needs in retraining which can improve their quality, curriculum content, approach of teaching & learning to make TVE is the main choice of parents to send their children to technical & vocational schools in Malaysia.

A. Curriculum Development of Training

The word curriculum means educational path and describes the learning process in much more comprehensive and complex fashion than is possible with plans learning content or learning material. These days curriculum development is oriented towards the learner it means to the students or trainee and the learning process than towards the content of learning. A curriculum in contrast provides information on the following aspects of learning:

- At whom is the educational process aimed?
- What goals and qualifications are to be achieved?
- What contents are to be learned?
- What teaching methods and aids are to be used?
- How is the result to be tested?

The effectiveness of training system dependant on a well developed curriculum must be measured by the extent to which:

- It is able to attract then young generation into the occupation of the future and skills which employers need
- It is able to deliver not only technical contents (technical skills) but also help students to learn how to cope with new challenges and prepare them for the long life learning
- It is able to provide people with the basic set of skills it takes to transfer from one job or area of work to another, once they have entered the workforce and it offers access to all without the constraints of entry requirement.

Retraining for TVE Teachers

What is the retraining need? Retraining is defined as upgrading of existing skill or acquiring a new one. Upgrading skills can be by accelerating - by doing and joining program in other TVET institution or centres. The performance of teacher in TVE is important to make the Technical School in Malaysia is the selected school for parents to send their children and choose the TVE field as a carrier path. Teachers should attend retraining to improve their performance and knowledge especially to make students more in teaching and learning session. They can have short or long term of retraining depends on the needs. Figure 1 show why retraining need.

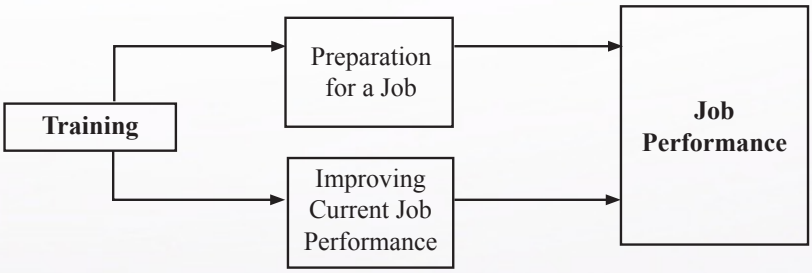

Figure 1: Short-term focus of training

The need of retraining for TVE teachers in Malaysia will begin when the new of assessment introduced for vocational students in 2006. The new approach of assessment for vocational students is competency-based education and modular system was implemented. Back to the basis objectives of vocational education to prepare students gain job-oriented education, clear career pathways and opportunities to gain access to higher education. The challenges of this situation are (Yusof Harun, 2008) ; retraining of teachers to enable them to teach any vocational subjects, getting industries to be mentors to enable the department to train students who are suitably skilled for the work place, developing multi-skill students and gaining international accreditation for the courses offered. This paper is to discuss and analyze the element of retraining needs for TVE teachers in terms of development of curriculum, program design, the nature of learning materials and stakeholder's involvement.

A. Retraining Program Design

The program should design towards adult learning characteristic. The characteristic of training is similar of characteristic of learning which will prepare how people learn and develop competency and expertise in the subject. Teachers will involve in this program will adapt lifelong learning experience in their carrier. The program should be designed with corporation in companies and industries involved. In designing training program, the specific outcomes are requiring to prove the competencies. Competency is one ability to perform tasks based on specific criteria; knowledge, skills, behaviors and attitudes. It is observable, measurable and practicable. Each individual can acquire competency if given the appropriate instructions, guidance, teachings, opportunities and time. The training need analysis should be identified including a job or skills analysis to develop retraining course for teachers. This analysis will allow identifying what is required of individuals performing. Figure 2 shows that the suggestion analysis phases of program design.

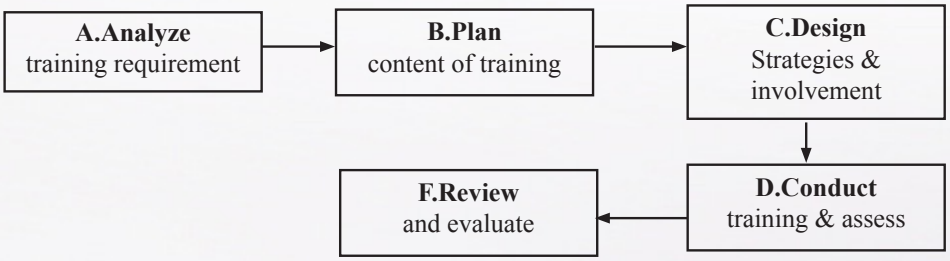

Figure 2: Analysis Phase

Department of Technical Education, Malaysia Ministry of Education was planned the quality of retraining for TVE teachers to fulfil the requirement of new environment of vocational system for school level. These programs enable vocational teachers gain recognition from training agencies for acquiring competencies which are recognized at national and international level. It will comprise accreditation of teacher's skills by Skills Development Department and international recognition in the implementation of competency-based education and training by international agencies. The corporation between industries will enrich teacher's knowledge and skills. Teachers should attend the training in certain period and they will gain latest knowledge and technology in industries. The purposes of this special program are to exposure to the real work environment, knowledge on workshop management,

exposure to machinery maintenance and practicing teamwork as done in industries. All these factors will contribute continues knowledge and teachers will know what had happened in industries it will help delivery of knowledge to their students.

B. Learning Method and Materials

The changing of pedagogy is important to more learners cantered. In classroom or workshop teachers should plan and implement new approach of teaching and learning. Teachers still use the traditional method because they did not exposed with the new trend of teaching especially for experienced teachers. Nowadays there various types of method and materials can be used in teaching. The suitable method in vocational education can use such as problem based learning (PBL), work- based learning, project -based learning and blended learning. Students can use the various source of materials from internet or discussion besides the text books provided.

i. Problem-Based Learning (PBL)

The process of PBL (Galgher, Resenthal & Stephen, 2004) can help students become better at problem-solving. The process of solving problems encourages students working together; learn critical thing skills and they will become self-directed learners.

ii. Work-Based Learning

The approach of work-based learning is an application in industrial work setting where schools and colleges are placing students to learn skills in workplace environment. It is an alternative to classroom training; action learning has been adopted by business schools and corporation as work-based experimental. Teachers should be able to know how to implement this method to prepare students in work-based experience. The characteristics of the method are knowledge and skills relevant for an occupation that contain essential elements of work identified by actual work.

iii. Project-based learning

Project-based learning offers quite a different take on the relationship between working and learning and between being a worker and learner. Teachers will give students the task integrate previous learning to using their experience in 'real' workplace and try to solve the 'real' work problem. It will help students more expose to real world of work and can be understood as the kind of thing that real workers do.

iv. Blended learning

Globalization and technology are altering our views on education and educational offerings. Technology has given to many new avenues for learning. To name a few, online learning, teleconferencing, the Internet, computer assisted learning (CAL), web- based distance learning (WBDL) and other technologies currently exist. In turn, they have helped to coin the term "blended learning" (BL), and although the term is still ill- defined, BL has entered into the training and education scene and is gaining popularity. BL is no longer a fad but is now expanding and getting established, although rapidly changing.

Stakeholders Involvement

To achieve the level of vocational education to higher level the participation of other stakeholders is needed. Parents and industries should know their role to more upgrading the vocational schools. The program for teachers training with industries attachment will contribute the new standard of TVE teachers. The industries will be mentors to enable the department to train students who are suitable skill for work place. Teachers can be highly skilled worker with relevant competencies in vocational course in schools. To develop the qualification of teachers the embedded of actual theoretical knowledge and practical experience on the specific vocational subject they teach.

Conclusion

The need of training and retraining is importance in order to develop innovative TVE teachers. Implement of a coherent but flexible structure of teacher training programs on different level based on the high standard of teachers. Malaysia should have the new National TVET-Teacher Qualification Standards as criteria against which somebody will be assessed for entering or exiting a specific teacher-training program as an element of lifelong professional development. These standards should be developing as a first step when modernizing the existing teacher training system. Skills accreditation programs for vocational teachers should be more which can collaborate with Skills Development Department in Ministry of Human Resource. To overcome the lack of skills among teachers, they are required to attend to short-term courses to improve their skills.

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RESEARCH AND DEVELOPMENT FOR CAPACITY BUILDING IN TVET: THE INTERNATIONAL PhD PROGRAMME BETWEEN UTHM AND ITB GERMANY*

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Abstract

The Ninth Malaysia Plan, which is one step on the way to achieve Vision 2020, features a separate section on Technical and Vocational Education and Training (TVET). It assigns responsibilities for TVET teacher education at the various levels to specific institutions such as polytechnics and community colleges. Malaysia will also face significant challenge as the country is set to become industrialized. Strategic knowledge and skill have to be the basic form of capital to position Malaysia towards industrialization. The education system especially in TVET must yield K-workers to push Malaysia into the K-economy. The Malaysian government has been dedicated to reform the education system and to place Malaysia into a world-class education hub. One critical strategy taken by the government is to implement the National Dual Training System (NDTS). Universiti Tun Hussein Onn Malaysia (UTHM) has been the key institution that strives to fulfil the national objective. UTHM offers and supply qualified TVET professionals at the academic levels of Bachelor, Master, and PhD programme to enrich the human capital of the nation. Due to the active international involvement and excellence recognition of UTHM as a TVET provider, a cross country research project involving UTHM from Malaysia, Universitat Autonoma de Barcelona (UAB) from Spain, The Institute Technik und Bildung (ITB), Universität Bremen from Germany and Vocational Education Development Centre (VEDC) Malang, Universitas Pendidikan Indonesia (UPI) Bandung and Technical Education Development Centre (TEDC) Bandung from Indonesia has agreed to partnership cooperation on a research project funded by the European Union Asia Link project

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headed by ITB. The research is focus on the development of trans-national standards of teacher training, their accreditation as well as the development of curricula. To strengthen the international collaboration, UTHM has taken an innovative initiative to work closely with the Universität Bremen from Germany to structure a German-Malaysian PhD programme. The cooperative program will facilitate the reorganization of Malaysia's professional training scheme by benchmarking the German's work-based TVET system. Currently, 18 candidates have already enrolled into the programme pursuing their doctorate academic advancement. As the Prime Minister of Malaysia put forward in his speech "We will need more thought-leaders, creators and innovators to achieve our aspirations", this PhD graduates will definitely becoming the backbone to our NDTS transformation. The paper will highlight the existence, process and implementation of the innovative German-Malaysia Joint PhD programme.

Keywords: capacity building, TVET, international collaboration, joint programme.

Introduction

Universiti Tun Hussein Onn Malaysia (UTHM) has been proactive in building the capacity in TVET. UTHM is a recognised UNESCO-UNEVOC centre for the country since 2001. In relation to the recognition several important activities have been initiated and organised through the Faculty of Technical Education to justify and promote its existence in TVET. Apart from specialising in TVET teacher training, other strategic and equally important activities include enhancing bilateral relationship with several local, regional and international based communities, such as professional bodies, multi-nationals companies and TVET providers. The purpose is to become a leading provider and referral centre in TVET through positioning ourselves in the centre of the networks. Among the platforms are inter-varsity academic support and exchange of expertise, advance studies and graduates supervision, research and staff development activities, and also engaging in collaboration projects with other local entities and international TVET providers. Hopefully through these bilateral relationships may help us to enhance our TVET programmes towards becoming one of the world-class TVET providers. One of our strategies is by learning from more successful and renowned TVET providers and community globally. Until today, Faculty of Technical Education has produced more than 2000 graduates currently serving as TVET teachers, instructors and lecturers in schools, polytechnics and community colleges, public

and private institutions throughout the country. At the international level, we have engaged in collaborations and networking with international organizations such as Southeast Asian Ministers of Education Organization Regional Centre for Vocational and Technical Education and Training (SEAMEO VOCTECH), Korea Research Institute for Vocational Education and Training (KRIVET), Colombo Plan Staff College for Technician Education Philippines (CPSC), The National Centre for Career and Technical Education USA (NCCTE), European Centre for the Development of Vocational Training (CEDEFOP) and many more. We also have expanded our research building capacity to international level. For example, in December 2005, UTHM joined consortia of researchers from Germany, Spain and Indonesia in an international research grant in teacher education in TVET. This interaction in international research activities also served as a platform for enhancing closer rapport and understandings between the participating institutions and resulted in more opportunities for further cooperation. The International Joint PhD programme in TVET is the exemplar of how the idea that first informally concepted out during the interactions has today, become the reality. Therefore, this paper briefly describes the measures adopted by the Faculty of Technical Education UTHM in handling the International Joint PhD programme between UTHM and ITB Germany. Among the points included in this paper are how the measures were taken to ensure the best interests of research students are met and also on how the enhancement of the core competencies and expertise of faculty being implemented through the programme.

The National Scenario

The Ninth Malaysia Plan, which is one step on the way to achieve Vision 2020, features a separate section on Technical and Vocational Education and Training (TVET). One of the issues that had been recognized as very important towards achieving the vision was the development of human resources (Abdullah, Rose & Kumar, 2007). Human Resource Development (HRD) appears to be a key factor in further developing the country and to be expected that TVET will and should grow even faster than the economy as a whole. High growth rates of education and TVET are well within the governments financial capabilities. Human resource capital also represents the most valuable asset to ensure that Malaysia can increase its competitiveness at the global level.

The focus towards HRD had, been intensified and became one of the regular features in the government policy. Strategic knowledge and skills have to be the basic form of human capital. In order to position Malaysia towards industrialization, skills training had emerged as a visible and distinct component of Malaysia's education and training system by the late 1970s. TVET has been rest with an important social task in the country as the future orientation of the workforce preparation and training is based on the cultivation of occupational competencies as prescribed by institutions, which was dominated by three different streams or pathways, distinguishable in terms of producing the country's workforce:

Table 1: Main Streams of the Education and Training System in Malaysia

Stream or Pathway	Institutions	Workforce Preparation
1. Higher Education	Universities and other institutions of higher learning, both public and private	Professional and managerial personnel such as engineers, architects, and surveyors
2. Technical and vocational education	Polytechnics, technical colleges and (more recently) community colleges	Supervisory personnel such as technical assistants and supervisors
3. Vocational skills training	Skills training institutions, public and private	Skilled and semi-skilled workers

The Malaysian government has been dedicated to reform the education system and to place Malaysia into a world-class education hub. This is due to rapidly growing economy and urgent requirements for qualified workers, to face an education system which no longer satisfies the demands. The education system especially in TVET must yield K-workers to push Malaysia into the K-economy. K-workers are essential for the country to make investments in technology and workplace requirements which will contribute to sustainable growth.

Therefore, Malaysia requires a flexible and competence workforce that is adaptive to change. The workforce needs to be continuously equipped with knowledge and skills to increase Malaysia's competitiveness in the global market. This requirement is leading to a demand on the skills delivery system, which are particularly the roles and responsibilities of TVET teachers or trainers. With the sharp focus in producing skilled labour-force, each level of target workers in Malaysia should be provided with different needs of teacher training.

For this reason, Malaysia decided to remodel its professional qualification system according to German standards, which was designed as early as in 1999. On 13th June 2003, the Economic Planning Unit (EPU) has announced that they will go for the dual system in the delivery of TVET. Thus, the Government of Malaysia decided on 19th May 2004 to implement the National Dual Training System (NDTS). In recognition of the excellent contribution in TVET teacher training, UTHM was invited to support the NDTS through providing pre-service and in-service training, research and development activities as well as providing higher studies in NDTS. In the initiative of Malaysia to achieve NDTS, at the same time UTHM have already committed in the EU-AsiaLink's project which has bearing with TVET. One of the project outcomes was to help the implementation of NDTS in Malaysia. Therefore, UTHM has made a drastic collaborative effort with ITB to structure a Joint PhD programme. The Joint PhD programme is solitary approach to qualify future leadership. With research done in the scope of their doctoral theses, programme participants are concerned with the construction of the NDTS which is supposed to guarantee the high professional training quality in the future.

Internationalization Programme

Internationalization is an ongoing and future-oriented process of integrating various international perspectives into our higher education. The perspectives may be related to the curriculum, programmes offered, top managers, faculty members, students, facilities and even the institutional visions, to suit the diverse and ever-changing environment and demands that are more global (Saat, 2007). The reasons for internationalization are such as an increase student and faculty international knowledge capacity and production; strengthen research and knowledge capacity and production; create international profile and reputation; contribute to academic quality; broaden and diversify faculty sources and students and promote curriculum development and innovation (Biarnason, 2007). Therefore, internationalization

programme is defined as a programme with an international orientation in content, aimed at preparing students for performing (professionally/socially) internationally and multicultural context, and designed for domestic students and/or foreign students. Through internationalization programme, university also can strengthen research and innovation activities through international collaborations and network, and wider recognition.

International Collaboration

Collaboration is a recursive process where two or more people or organizations such as university work together toward an intersection of common goals - for example, an intellectual endeavour that is creative in nature - by sharing knowledge, learning and building consensus. International collaboration is a key link in the university's activities. Its ancient tradition of learning and its outstanding research have earned the University an excellent reputation and a given place in the international research community. The University is much in demand as a collaborative partner from universities around the world. Improvement in the quality of research, the teaching and learning process and curriculum has long been heralded as a positive outcome of international collaboration. Through exchange of good practice, shared curricular research collaboration, and mobility of professors or students, there is much to be gained through international collaboration. A recent trend has been the establishment of joint programmes between universities in different countries that lead to double (or multiple degrees) and in some cases a joint degree, although the latter faces steep legal constraints. Joint programmes are intended to provide a rich international and comparative academic experience for students and to improve their opportunities for employment (Knight, 2008).

The International PhD Joint Programme

The early idea of having a joint programme was discuss informally during a research project interaction in a European Union Asia Link Research partners attended by UTHM and ITB. Then the idea was taken up by UTHM as a basis of having a formal academic cooperation with ITB in the area of teacher training at higher level. This brings to formal discussion and exchange of opinions between the two universities.

In 2006, the Faculty of Technical Education Universiti Tun Hussein Onn Malaysia (UTHM) and Institut Technik und Bildung, Universität Bremen, Germany (ITB) have set up a joint PhD programme in TVET, a teacher training programme at higher education level (Spottl, 2007). Students on this special programme can expect to obtain their doctoral degrees after the minimum period of four years of study. The purpose of this programme is to provide teacher qualification at PhD level to personnel engaged in the training sector. As part of the capacity building for the newly introduced National Dual Training Scheme (NDTS), this programme also provide a direct exposure to the actual practicing system of traditional dual training system in Germany. This research-based programme enables the students to do their research partly in Germany and partly in Malaysia. The specific focused research themes generated by the students, also provide new and useful insights for both countries. For Malaysia, it is useful in providing concurrent awareness on how best to fit the newly NDTS in the country, while for Germany, it is also useful to open the eyes for alternative routes for the modernization of the German TVET system (Dittrich, 2006).

The Implementation

Before the implementation of the International Joint PhD programme, the faculty has identified four equally important and interrelated factors that must be carefully addressed in any decisions being made to implement the programme. The factors that offered utmost challenges to the programme designers of this programme are as follows;

- Firstly, the expectations from the government, in particular the Ministry of Human Resources (MoHR) as the major stakeholder of training in Malaysia, to strengthen the delivery of training through NDTS. UTHM has been invited to support the Department of Skills Development (DSD) of the MoHR to ensure the success of the NDTS through providing special pre-services and in-services programmes for the staff. This International Joint PhD programme is one of the first commitments of UTHM for NDTS.

- Secondly, the PhD students have to satisfy the minimum of six month stay as the eligibility period at ITB. However, as full-time staff, they are only permitted to be off duty up to the maximum of three months. By taking this challenge into account, their stay at ITB has to be planned into two stages of three months respectively.

- Thirdly, the belief that the faculty understanding knowledge on the German model of Dual Training System are still relatively inadequate without having seen the actual practice in the country. Hence, UTHM need to find partners in Germany to provide direct exposure on the actual practice in the country.

- Finally, in order to fulfill the vision of UTHM to become a world class TVET provider, there is a need to strengthen the provision of its programme through international collaboration channels so as to be abreast to the challenge of globalization.

Joint Supervision

Joint supervision encompasses a range of supervisory practices, but at heart refers as two or more supervisors sharing responsibility for the academic support and development of a research student's doctoral education. Departmental, faculty and institutional practices, as well as personal preferences and the demands of one's subject area make it more or less easy to adopt one of the ranges of models of joint supervision (Peelo, 2008)

The reasons of joint supervision are a mixture of pragmatic and academic, grouped under three headings of benefits to supervisors, students and universities:

- **Benefits to supervisors**

  1. For supervisors' support and development, especially for new researcher to gain an experience and knowledge from the experts who has a great deal of experience in his or her research field.

  2. Separate tasks can be allocated to different members in a team. For example research ideas from other researcher will be beneficial for knowledge development process.

- **Benefits to students**

  1. To provide a range of judgments and experience to draw on throughout the student's doctorate study.

2. The students still remain with the research study even though the supervisor is transferred to other universities. This is because either internal or external supervisors will leave, students can still refer their research study with the other supervisor.

- **Benefits to universities**

1. Less problematic to change supervisors if there are disagreements between a student and a supervisor.

2. Compliance by local university regulations and joint funding councils.

Structure of the Programme

In the implementation of any programme, the major concern for the designer is to find the best approach that may provide the best possible solution to the problems that may otherwise hinder potential students from taking up the programme. Without compromising the quality of the programme and also the interest of the students, our challenge is how adjustment should be made so that expectation of the government and the interest of the students can be blended harmoniously to meet the qualifying criteria of the universities.

Therefore, based on the identified challenges mentioned as above, and also to ensure that the best interest of students is met, UTHM has adopted the following component and structure of implementation (Appendix).

1. Premise of the Programme

The programme is divided into two components based on the premises of study that is in Malaysia and in Germany. The component in Malaysia is divided into the research and the teaching parts. While the Germany component is implemented in two stages of visits of three months each by the students. The detail picture of how the programme is being carried out is as follows;

1.1 In Malaysia

During the study period in Malaysia, students should enrol at UTHM and are required to fulfill the academic components of the PhD programme of about 110 credit hours. It is divided into 20 credit hours of compulsory subjects and the 90 credit hours of equivalent research works throughout the programme. The 20 credit hours of compulsory classes are given during the first two semester of their study in research methods, statistics, and teacher education and also basic German Language classes. The purpose is to help the students in their future research works as well as to prepare them during their visit to Germany. While the 90 credit hours of equivalent research works are assessed through presentation of proposal, semester progress reports, supervisors reports and the final viva voce (KUiTTHO, 2001). It also covers both the component in Germany and Malaysia. The continuous assessment adopted by UTHM is to monitor their progress to ensure their success in PhD programme.

1.2 In Germany

The six months of study period in Germany is divided into two visits of three months each. In the first visit, students are to develop their proposal. In the process and with the help of their supervisors they are to learn and expose themselves to the dual training system in Germany through industrial visits and attachment and also to conduct literature search related to their specific area of research. The first experience in Germany will provide the opportunity to explore and understand the real concept and practices of dual training system in Germany. The second three months of visit to Germany is, to continue their research work. With the help of their supervisor in Germany, they are given the second opportunity to arrange for a re-visit to industries to conduct an in-depth study in their area of research. The second experience in Germany will provide them with a thorough understanding on the actual strength of the system from the perspective of their focus area of study.

2. Research Supervision

Supervision of graduate works is carried out by both of the universities where each student shall be supervised jointly by UTHM and ITB. The supervision in UTHM will be complemented and refined by the supervision process in ITB and vice versa. In Malaysia, the student will be supervised by professors appointed by UTHM, and while in Germany by professors appointed by ITB. To enhance the quality of supervision and also to build up the capacity of the faculty, the university has appointed two supervisors for each student. At the same time co-supervisors from other local universities are invited and appointed to conduct team supervision. The supervisor(s) are selected and appointed based on their expertise and recognized strength in PhD level supervision in TVET. The benefit of this local co-operation in PhD supervision is in the pooling of expertise, maintaining standard and as way of knowledge sharing among local providers.

Upon registration, students meet and discussed with their supervisors assigned by the Graduate Schools of UTHM. Within the first six months of their study, they are to prepared a brief but highly focus proposal of what they intend to do as their research works. It is mandatory for the students to present and satisfy the proposal screening process and also to take compulsory subjects before being allowed to proceed to the next stage in ITB Germany. At ITB Germany, the students will spend their next three months to refine their draft to sufficient proposal under the guidance of supervisors assigned by ITB. They will have to satisfy another screening of proposal in order to be accepted as PhD students by ITB. Upon returning home, the students have to report their proposal's progress to UTHM before being allowed to proceed to the next stage. They shall spend the rest of their study period for field observation and data collection in Malaysia. In the process, they are expected to work closely with supervisors, both local and abroad through attended and unattended means. Continuous online supervision and consultation are expected to be maintained between students and both of their supervisors in Germany and in Malaysia. The students may exchange messages through emails, internet, fax, telephones and the Blackboard 8.0 online learning facility set up by UTHM to seek opinions and check on progress with their supervisors and also to the faculty. Supervisors from ITB Germany shall also visit UTHM to check on the progress of students during their research stage in Malaysia.

The academic procedure in UTHM requires students to submit a written progress report on their achievement for every semester to the Graduate School. Only upon satisfying this requirement, the students may be allowed to further their study into the next semester.

3. Research Area

As the focus of the programme is to provide PhD qualifications to the students in the area of dual training system, the focus area is predetermined by the faculty. Students together with their supervisors are allowed to make amendments to suit their specific interest of study. Thus, the findings of the research works will contribute to enhance the capacity of NDTS framework in Malaysia and also as an eye opener in improving the provision of the traditional dual training system in Germany.

Examples of the proposed research topics are as the following:

- Customer Satisfaction and Effectiveness of National Dual Training System (NDTS) Programmes.
- The Role of Organisational Development in National Vocational Training Council (NVTC) To Enhance the Implementation of National Dual Training System (NDTS).
- The Participant of the Small and Medium-Sized Industries (SMIs) In National Dual Training System (NDTS).
- Role of Industry Personnel as Coach in the Implementation of National Dual Training System (NDTS).
- Generic Skills in the National Dual Training System: Implications on Institutions and Industry.
- The Development of a New Curriculum Model for the National Dual Training System in Malaysia.
- The Readiness Level of Vocational Training Institution in Malaysia for the Implementation of National Dual Training System.
- The Integration of the National Occupational Skill Standard (NOSS) Into the National Dual Training System.
- A Malaysian Model of Training Collaboration between Government Technical Institution and Industry, Based On National Dual Training System.
- Developing And Testing Assessment Framework For National Occupational Skills Standard (NOSS) And National Dual Training System (NDTS) Based Training System.

4. Teaching Component in UTHM

The purpose of the teaching components is to support the students to enhance their research ability. The first cohort with two groups of five students each is combined to enhance the effectiveness of the delivery. Therefore, the teaching component at UTHM is only conducted when the two group are available in the campus. The first teaching component was conducted during their initial proposal stage while the second teaching component immediately upon the first group returns from Germany. While for the second group of five students the class is conducted before their first visit to Germany. The benefits are to enable discussions and sharing of experiences between the students that have return from Germany and those who are going for their first trip to Germany.

5. Examination

The programme is expected to be completed within the minimum period of four years. The final examination stage in the form of oral and verification of thesis shall be conducted in accordance to the agreed procedures by both universities. Eventually, upon satisfying the conditions of UTHM and ITB, the students shall be entitled for the PhD degree awarded by each university, which they have involved.

Our Expectation from the Programme

The International Joint PhD Programme between UTHM and ITB has provided a new and useful experience for UTHM as it is the first of joint programme ever conducted by the Faculty of Technical Education with the Institut Technik und Bildung Universitat Bremen, Germany. This international cooperation in academic programme is very unique. The programme not only open a new horizon in the international cooperation but also offers synergy effect in its own and special manner.

1. The international Joint PhD Programme between UTHM Malaysia and ITB Germany has contributed to the promotion of bilateral relationship and understandings between Malaysia and Germany, both in the cultivation of intellectual knowledge and also cultural knowledge that are most beneficial in cultivating closer ties between the two countries.

2. The character of development and delivery of the programme which is highly customized may has set new dimension for the international cooperation and also the future delivery of TVET in the forms of resources sharing and focusing of expertise.

3. The topics undertaken by research students in this programme are directly related to practice-related problems of NDTS confronting the training sector in Malaysia.

As a whole, it has been expected that this program is unique in many ways. From the macro perspective, this programme provide as a platform to enhance knowledge transfer between the two countries, and as an effective approach of raising expertise and potentials of local cooperating institutions to the new standards of international practices. While from the micro perspective this programme has significant impact in changing the manner of conducting research-based programmes from traditional approach towards a more creative and innovative mode of delivery between the international providers in a win-win situation for the collaborating parties.

Therefore, in addition to the personal benefits gained by the student, this programme is also an eye opening to the policy makers of the vast potential international interaction between the TVET players and providers. In this example, the students engaged in this programme shall have the opportunity doing research in the German TVET system and concurrently explore the possibilities of how to implement and modify the traditional system into the new Malaysian version of NDTS implementation.

This research will also contribute to the development of NDTS in Malaysia whereby more realistic and systematic approach will be employed which would led to a more guaranteed and effective system of training.

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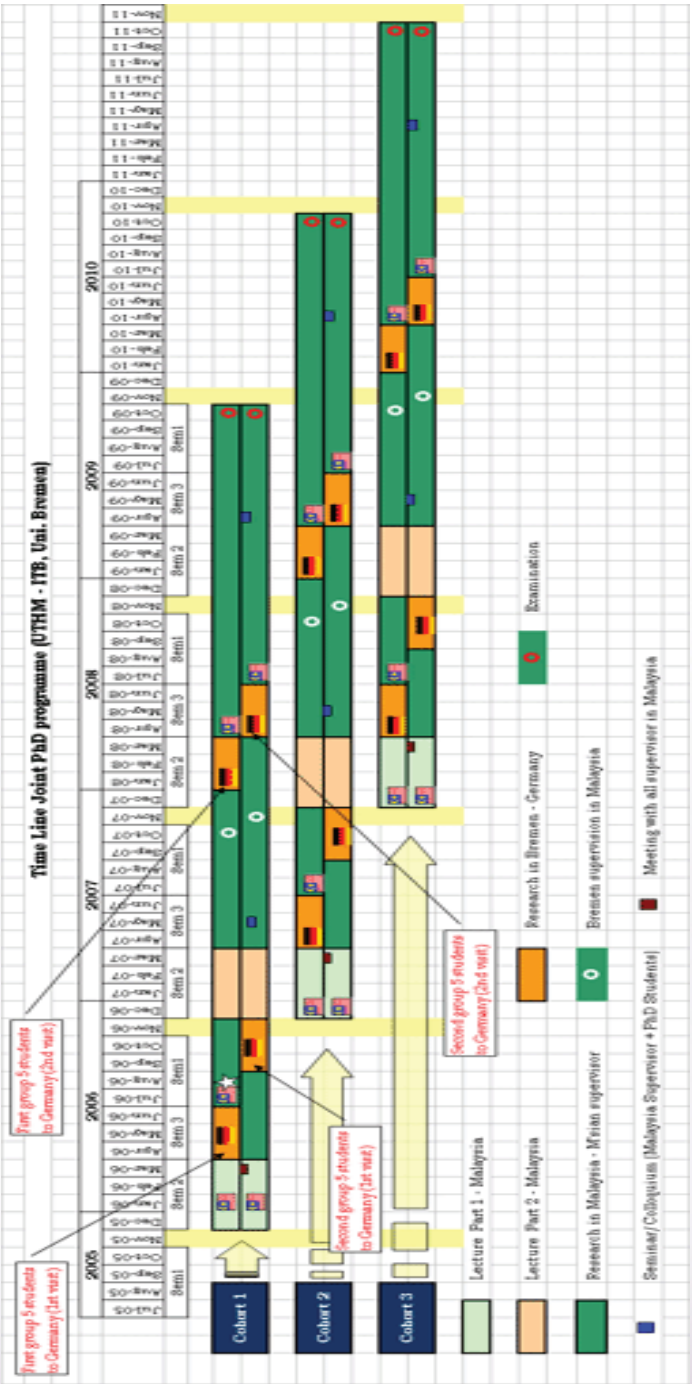
Appendix:


Time Line Joint PhD programme (UTHM - ITB, Uni. Bremen)
2005
2006
2007
2008
2009
2010
Sem 1
Sem 2
Sem 3
Sem 1
Sem 2
Sem 3
Sem 1
Sem 2
Sem 3
Sem 1
First group 5 students to Germany (1st visit)
First group 5 students to Germany (2nd visit)
Second group 5 students to Germany (1st visit)
Second group 5 students to Germany (2nd visit)
Cohort 1
Cohort 2
Cohort 3
Lecture Part 1 - Malaysia
Lecture Part 2 - Malaysia
Research in Malaysia - M'sian supervisor
Seminar/Colloquium (Malaysia Supervisor + PhD Students)
Research in Bremen - Germany
Bremen supervision in Malaysia
Meeting with all supervisor in Malaysia
Examination

RELATIONSHIP BETWEEN INSERVICE TRAINING WITH STUDENTS' ACHIEVEMENTS AT TVET INSITUTIONS IN MALAYSIA*

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Abstract

In-service training in the field of Technical Vocational Education and Training (TVET) acts as a catalyst for students' achievements. Nevertheless, studies on the matter is still lacking especially in the context of its contributions by the teachers attending the training with students' achievements. This study, thus, aims to identify the effectiveness of in-service training attended by teachers at TVET institutions in Malaysia. Data gathered was collected using two sets of questionnaire, Set A and Set B. Set A was distributed to 43 teachers from technical schools while Set B was given out to 1225 students of the 43 sample teachers. Data collected was recorded and descriptive statistic analysis was carried out using SPSS version 12. Among the analysis carried out was the t-test to identify for differences in students' achievements whom the teachers taught either by those who have or have not attended any related in-service training. Findings of the study found significant relationship between in-service training attended by the teachers and teachers' teaching effectiveness, teachers teaching effectiveness with students' achievements as well as between in-service training with students' achievements.

Keywords: TVET (Technical Vocational Education and Training) and In-service Training.

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Introduction

Training or human resource development is defined as activities involved in raising skills, knowledge and behavioral change (Baharudin Razali, 1996). According to Tracey (1984), training and development comprise all activities aimed at developing career and new skills for employees to enable them become more productive continuously. Meanwhile, Nadler (1984) defines human resource development as a systematic learning experience at a particular time and designed to create change in behavior. The aim of human resource development is to achieve high quality work and produce products or service of utmost quality in the organizational surrounding and context where development is taking place (Kremp and Pace, 2001). Thus, in can be summarized that human resource development is closely related to training, knowledge and behavioral change.

Dearden et al. (2005) conducted a study on industrial data acquired from the British Data Panel from 1983 till 1996 in order to identify the effect of training on productivity and wage. They found out that training that was related to task had high significant relationship with productivity. Every increment of 1 % in training resulted in increment in productivity added value of 0.6%. Other kinds of training outside of task area were recommended towards increasing the productivity of the workers. A study by Everett (2004) from the Institute of Organization Performance, United States was conducted to identify the training relationship with workers' performance for Studio City Sheraton Hotel whereby the results show that there was evidence of relationship between training and work performance of the hotel staff.

Several studies were done on the effectiveness of human resource development program in Malaysia and overseas. Wilson and Harris (2003), Knox et al. (2003) and Betts (2003) did a study on the relationship between teachers' effectiveness and students' achievements. However, there are insufficient studies on similar issues especially at TVET institutions in Malaysia specifically secondary technical schools. This study is a continuation of a study conducted by Wan Mohd Rashid (2000) who suggested that more detailed studies on the effect of in-service training for staff development programme be carried out.

The objective of this study was to identify the effectiveness of in-service training attended by teachers on their teachings in TVET and students' achievements. Generally, the findings of the study show that in-service training produce positive results on the part of the teachers in technical and vocational disciplines in Malaysia.

Related Work

A lot of studies on the effectiveness of in-service training on the performance of workers at private firms both locally and abroad have been done. However, very few studies were carried out on the relationship between in-service training and students' academic performance especially in technical and vocational education. However, the numerous studies carried out on workers at firms serve as a guide in course of this study. This is because teachers too serve as workers but in an educational organization and they are also not exempted from attending in-service training programs.

Dearden et al. conducted a survey on industrial data that was collected from the British panel data from 1983 to 1996. This was to identify the effect of training on productivity and salary. They found that training which was related to their job had high significance related to productivity. Every one percent improvement in training causes an improvement of 0.6 percent in productivity. Other trainings, which are beyond their job scope, are also proposed by them in promoting the employees productivity. Everett (2004) from the Institute of Organization Performance, United States of America, conducted a study on identifying the relationship between training and performance among hotel employees of Sheraton Studio City Hotel. The hotel was facing financial and staff management difficulties hence a study was carried out. Training was carried out on the hotel staff that focused on cooperation, trust and staff motivation. His findings revealed that there was significant relationship between training and workers performance. The outcome of the training resulted in reducing staff turnover by 20% and increase customer satisfaction by 8%. It also raised the share market value by as much as 24%.

Meanwhile, other studies conducted by Morin (2004) on 1484 workers in Canada revealed that their participation some kind of training program known as University Corporate Training has little effect on one's work performance but produced positive relationship with work performance. Krueger and Rouse (1998) who studied on educational effect at the workplace on salary, turnover and worker's performance found that in-service training had positive relationship with work performance in two sectors, namely, manufacturing and the public. Saks (1996) did a study on the number of training program attended by workers with worker's performance. A total of 152 new workers were selected as samples and analysis of the study found that the number of training programs received by the workers had significant relationship with work satisfaction, commitment and work performance. Meanwhile, a study on the relationship between on-the-job training with workers' productivity was conducted by Bartel (1995) and he discovered that it had positive and significant relationship not only on changes in the workers' performance but

wage increment as well. A study on training relationship with work performance was also carried out in Malaysia. For example, a study by Baharudin (1996) on 30 workers of Small-Medium Industry (SMI) owned by the Bumiputera (Son of the Earth) in the city of Johor Bahru found that induction training program carried out had positive and significant relationship on the workers' performance of the lower rank. Ahmad (1997) did a study on in-service training needs among staff of the Kluang Veterinary Institute involving 60 respondents as samples. His study found that the majority of the respondents agreed that the training received had increased their performance in terms of knowledge, skills and behavioral change. Similar finding was also acquired by Azizah (1997) who did a study on Celcom Technicians from the East-coast region. Her study revealed that there was positive relationship between training with the technicians work performance but weak between age with work performance.

Nevertheless, the study done by Siti Fatimah (1998) on the relationship between in- service training and work performance showed a different finding from the other researchers above. Data was collected from 81 Batu Pahat Telecom technicians on several aspects of the training program attended, their perceptions towards the training in increasing their knowledge, skills and work attitude. Using Person Correlation analysis the findings showed there was no significant relationship between work performances among the technicians.

Therefore, in order to achieve long term outcome from any one training three important elements which are skills, attitude and knowledge and human development (human factor) must be given emphasis in strategic planning towards raising work performance (Belilos, 997).

The effectiveness of any in-service training attended by a teacher in this study was assessed by the teacher and using the students' achievements of the respective teachers. According to Shaw (1995), assessment on effective and successful training can be measured among others using comments or views of trainees assessing the training attended, students' assessment on their teachers and also the students' improvement in learning through test and examination results, behavior and students' attendance. The position of teachers as a factor that has an impact on students' achievements other than school and student factors which Marzano (2000) identified that teachers produce as much as 13% impact on students' achievements.

This study also found that students taught by effective teachers in an effective school surrounding can achieve leaps in their achievements. To ensure that teachers are always effective in acquiring the necessary knowledge and skills the school or relevant authority must implement meaningful in-service training, ensure support and provide sufficient time for their teachers to apply what have been learned. One

of the components that has direct or indirect relationship with teachers' teaching effectiveness as suggested by Cheng and Tsui (1996) are professional development activities that support the teachers' performance, expertise development and teachers' education as well as students' achievements.

A study by Cohen and Hill (2001) found that teachers whose in-service training is focused on the curriculum can teach well when what has been learnt are applied in the classroom. This study also shows that students' achievements are also good if their teachers participate in in-service training that focuses on the curriculum. In another study, Garet (2001) studied teachers' involvement in an in-service training that emphasized on Mathematics and Science subjects. He discovered that the teachers are more prepared to implement change in teaching practice, improved in knowledge and teaching skills when the training is very much related to daily experiences and parallel to assessment. Even though studies on in-service training programs are dominated by problem solving requirements there are also researchers who are interested to study on particular skills. As regards reading skills, McCutchen (2002) in his study found that a group of pre-school students achieved good results in their tests after their teachers attended in-service training on improving alphabetical pronunciation skills compared to other students whose teacher did not attend such in-service training.

Meanwhile, Darling-Hammond (2000) did a study on the quality of teachers and students' achievements in United States. She believes that teachers' qualification, education and staf development program do have relationship with students' achievements. All three elements can give clear differences in deciding teachers' capacity and quality in carrying out their teaching duties. This finding is also shared by Angrist dan Lavy (2000) who discovered that the in-service training received by school teachers in Israel has resulted in improving the examination results of their teachers. Zatta (2003) conducted a study on the effectiveness of the Massachusetts Curriculum Assessment System (MCAS-Alt) on disabled students' achievements. His findings show the existence of a relationship between teachers' experience in administering MCAS-Alt with students' marks. The study also provides an important finding that teachers' involvement in professional development activities or in-service training has a positive impact on the teachers' performance and students' achievements. Nevertheless, Jacob (2004) in his study found marginal increment in in-service training attended by teachers in Chicago, USA did not have significant relationship with students' achievements in Mathematics and reading

There are numerous studies on teachers' effectiveness in teaching and learning. They are more focused on skills and characteristics of effective teachers. Borich (2003) discussed about teaching behaviors that have positive relationship with students' achievements. Five key behaviors of effective teachers have been studied

consistently by researchers for the past two decades. The five key behaviors are learning clarity, variety in teaching, work orientation, commitment in teaching process and students' level of success and understanding. In another study, Andrews (2002) believes that effective teachers must be able to create a conducive atmosphere that allows students to like and can study. An effective teacher must also be able to identify students' aims, learning needs and styles. In addition, teachers must also have the ability to organize and present teaching materials that help students' learning and define required students' achievements as well as help in how they can be measured.

The above view is also shared in a study conducted by Wray and Medwell (2001). They believe that effective teachers often emphasize on students' knowledge in the teaching process. A teacher must also be someone who is knowledgeable in one's field and knows the right materials for use in order to increase understanding and students' self- development and not merely extracts from teaching content. Meanwhile, teachers who are effective with the school surrounding can influence students' achievements. This can be proven by a study conducted by Ornstein (1990) in Wan Mohd Rashid (2000) who found that students' achievements can be influenced by the teachers and school. The study reveals close relationship between teachers and school with students' achievements. Teachers play a very important role in changing the behavior of students through teaching and learning process. This includes technical and vocational teachers who act as guides for the students who need exposure to the latest knowledge and skills in order to secure future employment demands.

Students' achievements are influenced by teachers' teaching effectiveness other than individual and surrounding factors. Effective teachers' characteristics as presented by Morgan and Knox (1985) and Coker and Coker (1988) have a lot in common that can be categorized into knowledgeable, skillful, nurture good relationship with students and noble personality. However, effective teachers must also possess the ability to relate knowledge and skills with work setting.

Positive relationship between training and work performance and teachers' teaching effectiveness has been proven to exist by previous researchers like Darling-Hammond (2000), Garet (2001), McCutchen (2002) dan Everett (2004). Besides that, previous studies also found that teachers' participation in training programs can help raise students' achievements (Andrews, 2002 and Borich, 2003). Studies of students' achievements have been abundantly implemented by outside researchers. However, one question arises whether similar situation occurs at secondary technical schools in Malaysia especially in the state of Johor. This question sets the basis for the implementation of this study.

Methodology

This study is a quantitative study whereby data from questionnaire sets were analyzed to give meaning to the results obtained. Samples for this study comprised technical school teachers, senior assistants and students from five secondary technical schools that offer technical subjects under the administration of the Technical Education Department in the state of Johor, Malaysia - Sekolah Menengah Teknik Batu Pahat, Sekolah Menengah Teknik Kluang, Sekolah Menengah Teknik Muar, Sekolah Menengah Teknik Pontian dan Sekolah Menengah Teknik Segamat.

A total of 43 teachers comprising those who have and have not attended in-service training were selected as samples. From among the students, a total of 1225 students taught by each of the selected teachers were involved as samples. Four technical and vocational subjects were chosen for the study and they were Electrical Engineering Studies (EES), Mechanical Engineering Studies (MES), Civil Engineering Studies (CES) and Engineering Drawing (ED).

Item construction in the Questionnaire forms used to measure effectiveness in in- service training was adapted from the models by Tyler (Tyler, 1981) and Kirkpatrick (1998). An item for teachers' teaching effectiveness was adapted from Personnel Series Model 5001, Coker (Coker and Coker, 1988) and ILO (2001).
Before the questionnaire sets were distributed, a pilot study was conducted to test for reliability of the items constructed. 20 students and 24 teachers from technical schools in Johor were selected randomly to answer the questionnaire forms. Using Alpha Cronbach coefficient, Item A recorded an overall value of 0.959. Alpha Cronbach Coefficient values for each section in the questionnaire were also tested and it was found that Section B (items on in-service training effectiveness) recorded a value of 0.801, Section C (teachers' teaching after attending in-service training) 0.917 and Section D (teachers' teaching effectiveness) 0.947. Meanwhile Questionnaire Set B for students recorded a value of 0.921. Thus, it can be concluded that the questionnaire sets constructed were very suitable for use in the study. In addition, both sets of questionnaire were checked and verified by three experience lecturers.

Distribution of the questionnaire sets was done with the help of the Senior Assistants of the respective Technical Schools. The questionnaire sets were handed over to them who then distributed them to the teachers (samples). Prior to that, the researchers explained the objectives of the study to ensure that the samples understood instruments of the study. The teacher samples were given Questionnaire Set A while the students questionnaire Set B given to them by their teachers in class. Students were allocated 10 minutes to answer the questionnaire. The collected

questionnaire sets were given back to the Senior Assistants who later handed them over to the researchers a week later. All the questionnaire sets distributed were successfully collected and they were labeled or categorized according to the name of the school and teacher code for each subject. Data collected was processed using SPSS version 12. Descriptive and several inferential statistics analysis like t-test and Pearson Coefficient analysis were used.

Findings

The analysis was conducted to identify changes in students' achievements in their 2003 and 2004 final examination results (Test 1 and Test 2 respectively). This analysis was done to answer the research question"Is there any difference in the students' achievements for those who were taught by teachers who did and did not attend in-service training". Data used was secondary data which is students' examination results. For the purpose, two kinds of analysis were used. They were descriptive analysis that measured effectiveness in teaching by individual teachers and according to subject as well as use of t-test to test for difference in overall examination mean result.

For descriptive analysis, the positive sign (+) indicates that there is increase or positive change from the first and second tests. Meanwhile, negative sign (-) shows decrease or wearing of students' examination marks from test 1 to test 2. Frequencies and percentages in number of students for each test was used to make comparisons between the two tests. This analysis did not involve the 6 teachers from SMT Pontian because the school only started operation in early 2004. As such, the 2003 final examination marks data were not available. Students were categorized as pass if they scored a minimum of 40% and classified as excellent if they scored a minimum of 70% with a minimal grade of 2A (Table 2).

For the EES programmed, only four (4) out of nine (9) teachers selected had attended in- service training. Three of them (75%) recorded an improvement in the percentage of students who scored a pass as well as excellent (Table 1). Three out of five of the teachers (60%) had not attended any in-service training but showed improvements in the percentage of students who obtained a pass. In addition, only 40% of the teachers who did not attend in-service training succeeded in producing students who obtained excellence. Figures for teachers who attended in-service training were much higher than for those who did not do so.

The mean score values in the last column are the average value for the students' perception of their teachers effectiveness in teaching. For G1 and G16 teachers, they did not attend any in-service training and this contributed to the decrease in the percentage of pass and excellent among their students. This can be shown by the mean score value for teaching effectiveness that is lower among the teachers teaching EES subject which was at 2.257 and 2.783. For teachers who showed increment in the percentage of students who excelled they seemed to have high mean score value for effectiveness.

Table 1: Percentage of passes and number of excellent according to school and teacher for EES subject

School	Teacher	Percentage of Passes		+/-	Number of Excellent (%)		+/-	Average Score
		Test 1	Test 2		Test 1	Test 2		
SMTK	G1*	44.0	8.0	-	2 (8.0)	1 (4.0)	-	2.257
SMTK	G6*	25.0	31.8	+	0 (0.0)	1 (4.5)	+	3.104
SMTK	G11*	39.1	52.0	+	2 (8.8)	2 (8.0)	-	3.100
SMTS	G16*	83.3	44.4	-	2 (11.1)	0 (0.0)	-	2.783
SMTS	G19	59.1	95.5	+	1 (4.5)	4 (18.2)	+	3.033
SMTM	G27	75.0	79.5	+	6 (25.0)	3 (12.5)	-	3.028
SMTM	G28*	61.3	64.5	+	0 (0.0)	3 (9.7)	+	3.158
SMTBP	G34	78.9	89.5	+	9 (47.4)	10 (52.7)	+	3.328
SMTBP	G35	75.0	55.6	-	2 (7.1)	7 (25.9)	+	3.532

***Teacher who did not attend the in-service training for the years 2003 and 2004**

Among MES teachers, a total of six (6) teachers (75%) had attended in-service training while only two (2) had not. Among the six, 83.3% showed increment in percentage of students who achieved a pass while 66.67% of the six teachers scored a rather low mean score in effectiveness. For example, Teacher G9 and G23 each scored 2.746 and 2.647 respectively. Even though the mean scores for both teachers were low their percentage of students who passed showed an improvement from the first test compared to the second. In general, for MES subject the in-service training attended by the teachers have succeeded in raising students' achievements in the examination. Table 2 shows the percentage of pass and excellent among students for examination years 2003 and 2004 for the particular subject.

The percentage of passes and number of excellent among students for CES is shown in Table 3. It was found that six (6) of the CES teachers had gone through in-service training throughout the year 2003 and 2004. Among them, more than half recorded their improvements in both situations which are percentage of students who obtained a pass and excellent. Only G18 teacher did not show any changes in the number of students who excelled teacher G17 recorded the lowest mean score value on effectiveness besides decrease in the number of students who passed and excelled.

Table 2: Percentage of passes and number of excellent according to school and teacher for the MES subject

School	Teacher	Percentage of Passes		+/-	Number of Excellent (%)		+/-	Average Score
		Test 1	Test 2		Test 1	Test 2		
SMTK	G4	43.5	91.3	+	0 (0.0)	2 (8.7)	+	3.577
SMTK	G9	45.2	62.8	+	1 (3.2)	1 (3.2)	No changes	2.746
SMTK	G10	80.6	93.1	+	4 (12.9)	2 (6.9)	-	3.404
SMTS	G12*	87.5	88.0	+	9 (37.5)	10 (40.0)	+	3.093
SMTS	G15*	100.0	92.9	-	7 (24.1)	14 (50.0)	+	3.235
SMTM	G23	52.0	61.5	+	8 (32.0)	0 (0.0)	-	2.647
SMTM	G24	57.1	89.3	+	2 (7.1)	7 (24.9)	+	3.310
SMTBP	G30	95.0	100.0	+	7 (35.0)	19 (100)	+	3.040

***Teacher who did not attend the in-service training for the years 2003 and 2004**

Nevertheless, teacher G32 also recorded a decrease even though they have attended in- service training and the mean score value for teachers' teaching effectiveness was rather high at 3.330. The study shows that teacher G32 was an experienced teacher and involved in the administrative duties at the school. Students rated the teacher as effective due to his experience in teaching. However, administrative duties and out of office work commitments have affected his/her students' achievements.

Table 3: Percentage of passes and number of excellent according to school and teacher for the CES subject

School	Teacher	Percentage of Passes		+/-	Number of Excellent (%)		+/-	Average Score
		Test 1	Test 2		Test 1	Test 2		
SMTK	G7	40.6	80.0	+	1 (3.1)	7 (23.3)	+	3.200
SMTS	G17*	85.2	40.7	-	13 (48.1)	0 (0.0)	-	2.781
SMTS	G18	100.0	90.0	-	6 (20.0)	6 (20.0)	No Changes	2.963
SMTM	G25	100.0	76.7	-	14 (46.7)	17 (56.8)	+	3.048
SMTM	G26*	85.0	76.4	-	8 (28.6)	4 (17.9)	-	3.317
SMTBP	G31	76.0	96.0	+	9 (36.0)	21 (84.0)	+	3.601
SMTBP	G32	100.0	95.7	-	15 (68.2)	12 (52.2)	-	3.330
SMTBP	G37	33.0	58.3	+	8 (25.0)	12 (37.5)	+	3.291

***Teacher who did not attend the in-service training for the years 2003 and 2004**

The percentage of students who passed and excelled in ED subject is displayed in Table 4. It was found that all the teachers who taught the subject have attended in-service training in 2003 and 2004. The percentage of students who passed was high at 91.67%. Meanwhile, 75% of them showed increment in the number of students who excelled. The mean score value for teachers' teaching effectiveness was high between 3.101 and 3.505. Teachers who recorded students with excellent results that decreased had relatively low mean score for effectiveness as compared to other teachers. In general, the in-service training attended by the ED teachers had been effective in raising the achievements of their students.

The t-test was used to find out whether there was significant difference in students' examination results for those who were taught by teachers who had and had not attended in-service training. For the purpose, the 2004 final year examination result was used as the dependent variable. If the value of t was sufficiently large then null hypothesis was rejected, meaning that there was significant difference in student examination results. Results of the t-test are presented in Table 5. F-test was carried out to test similarity of variants among mark distribution for students. It was recorded as small which was 0.001. Significant value was 0.981 and larger than 0.005 concluding that the students' mark variants from the two groups of teachers who had and had not attended in-service training were not different. Meanwhile, t-test value was at -5.547 with a Standard Deviation of 1223. The

negative sign for t-test shows that students' marks were much lower for those who were taught by teachers who did not attend in-service training as compared to those otherwise. Significant value recorded was 0.000 that proved that there was significant difference on students' achievements that were taught by teachers who attended in-service training. Hence, Null Hypothesis was rejected.

Table 4: Percentage of passes and number of excellent according to school and teacher for the ED subject

School	Teacher	Percentage of Passes		+/-	Number of Excellent (%)		+/-	Average Score
		Test 1	Test 2		Test 1	Test 2		
SMTK	G2	65.6	93.5	+	10 (31.3)	18 (58.1)	+	3.200
SMTK	G3	63.0	75.0	+	6 (22.2)	16 (57.2)	+	3.483
SMTK	G5	32.0	88.0	+	3 (12.0)	16 (64.0)	+	3.164
SMTK	G8	53.4	78.3	+	3 (14.3)	1 (4.3)	-	3.169
SMTS	G13	73.7	75.2	+	4 (21.1)	10 (52.6)	+	3.297
SMTS	G14	77.4	93.3	+	3 (9.7)	17 (56.7)	+	3.504
SMTM	G20	62.5	66.7	+	4 (16.7)	3 (12.5)	-	3.101
SMTM	G21	7.4	89.3	+	0 (0.0)	9 (32.1)	+	3.421
SMTM	G22	89.5	72.2	-	8 (42.1)	4 (22.2)	-	3.124
SMTBP	G29	14.3	90.5	+	1 (4.8)	7 (33.3)	+	3.418
SMTBP	G33	7.4	10.4	+	0 (0.0)	0 (0.0)	No changes	3.346
SMTBP	G36	84.4	86.7	+	11 (34.4)	17 (56.7)	+	3.383

Table 5: T-Test for comparisons between achievements of students taught by teachers who have and have not attended in-service training.

	Levene's Test for variance		t-test			Mean	
	F	Sig	T	Df	Sig. (2 tailed)	No Training	Trained
Effectiveness of in-service training	0.001	0.981	-5.547	1223	0.000	44.55	50.74

*** signifiance level at 0.05**

The relationship between effectiveness in in-service training with teachers' teaching effectiveness according to school was positive as shown in Table 6. Findings show that the Correlation Coefficient value was high from 0.70 and 0.88 and significant at alpha level 0.05. A high Correlation Coefficient indicated strong relationship in effectiveness in in-service training with teachers' teaching effectiveness. SMT Batu Pahat recorded a high Correlation Coefficient value at 0.883 while SMT Pontian the lowest at 0.704. As such, it can be concluded that the effectiveness in in-service training attended by technical and vocational teachers with teaching effectiveness was significantly strong.

Table 7 displays the Correlation Coefficient between effectiveness in in-service training with teachers' teaching effectiveness according to subjects. All the Correlation Coefficients were significant at alpha level 0.05 that resulted in Null Hypothesis being rejected. EES recorded the highest Correlation Coefficient of 0.975 and followed by MES at 0.794. The finding reveals positive and strong relationship between effectiveness in in-service training with teachers' teaching effectiveness for EES and MES. Meanwhile, for CES and Engineering Drawing subjects, the Correlation Coefficient was recorded as moderate at 0.629 and 0.699 respectively. Findings show positive and moderate relationship between effectiveness in in-service training with teachers' teaching effectiveness of CES and ED.

Table 6: Relationship between effectiveness of in-service training with effectiveness of teachers' teaching according to school

School	Correlation Coefficient	p-Value
SMT Pontian	0.704	0.000*
SMT Batu Pahat	0.883	0.000*
SMT Muar	0.732	0.000*
SMT Segamat	0.789	0.000*
SMT Kluang	0.713	0.000*

*** signifiance level at 0.05**

Table 7: Relationship between effectiveness of in-service training with effectiveness of teachers' teaching according to subject

Subject	Correlation Coefficient	p-Value
Electrical Engineering Studies	0.975	0.000*
Mechanical Engineering Studies	0.794	0.000*
Civil Engineering Studies	0.629	0.000*
Engineering Drawing	0.699	0.000*

*** signifiance level at 0.05**

The next analysis was to identify the strength of the relationship between students' achievements through examinations marks with teaching effectiveness of technical and vocational teachers. It was found that the Correlation Coefficient was weak which was between 0.219 and 0.389 but was significant at alpha level 0.05 for all schools (Table 8). The positive and weak Correlation Coefficient values showed that there was positive but weak between teachers' teaching effectiveness with students' achievements at all secondary technical schools studied. However, SMT Batu Pahat recorded the highest Correlation Coefficent at 0.389. Meanwhile, SMT Pontian had the lowest at 0.219. This shows that there was enough evidence to reject Null Hypothesis. It can thus be said that there was significant relationship between teachers' teaching effectiveness with students' achievements of the respective secondary technical schools.

The Correlation Coefficient between students' achievements and teachers' teaching effectiveness according to subjects (EES, MES, CES and Engineering Drawing) was significantly low at alpha level of 0.05 (Table 9). This means students' achievements had positive relationship but low with their teachers' teaching effectiveness. Engineering Drawing subject recorded the highest Correlation Coefficient of 0.395 but lowest for MES at 0.272. Therefore, it can be said that teachers' teaching is very crucial and has significant relationship with their students' achievements.

Table 8: Relationship between students' achievement with effectiveness of teachers' teaching according to school

Subject	Correlation Coefficient	p-Value
SMT Kluang	0.312	0.000*
SMT Batu Pahat	0.389	0.000*
SMT Muar	0.340	0.000*
SMT Segamat	0.303	0.000*
SMT Pontian	0.219	0.007*

*** signifiance level at 0.05**

Table 9: Relationship between students' achievement with effectiveness of teachers' teachings according to Subject

Subject	Correlation Coefficient	p-Value
Electrical Engineering Studies	0.384	0.000*
Mechanical Engineering Studies	0.272	0.000*
Civil Engineering Studies	0.362	0.000*
Engineering Drawing	0.395	0.000*

*** signifiance level at 0.05**

The next step was to identify they relationship between the students' achievements and the effectiveness of the in-service training attended by their teachers. For the purpose, correlations analysis was carried according to school and subject and the results are shown in Table 10 and 11. A positive Correlation Coefficient illustrates that the relationship between the students' achievements and effectiveness of the in-service training attended by their teachers was positive and significant at Alpha level of 0.05 for all the secondary technical schools and the subjects studied. Overall, findings of the study showed that in- service training attended by technical and vocational school teachers can increase students' achievements in examinations. As regards correlation coefficient, SMT Batu Pahat and SMT Muar recorded a moderate value of 0.491 and 0.490 respectively.

This means there was positive but moderate relationship between in-service training effectiveness and students achievements for both schools. Engineering Drawing subject recorded the highest correlation coefficient value among subjects studied.

Table 10: Relationship between effectiveness of in-service training with students' achievements according to school

Subject	Correlation Coefficient	p-Value
SMT Kluang	0.339	0.000*
SMT Segamat	0.376	0.000*
SMT Muar	0.490	0.000*
SMT Batu Pahat	0.491	0.000*
SMT Pontian	0.361	0.000*

*** signifiance level at 0.05**

Table 11: Relationship between effectiveness of in-service training with students' achievements according to subject

Subject	Correlation Coefficient	p-Value
Electrical Engineering Studies	0.277	0.000*
Mechanical Engineering Studies	0.235	0.001*
Civil Engineering Studies	0.335	0.000*
Engineering Drawing	0.352	0.001*

*** signifiance level at 0.05**

The Correlation Coefficient values for other technical school education and subjects were low which was between 0.20 and 0.40 but significant at Alpha level 0.05. Overall, the analysis showed significantly low relationship between in-service training attended by the technical and vocational teachers and the achievements of their students. Even though this study reveals the existence of low and moderate

relationship among variables but it is still significant at alpha level 0.05. This proves that the relationship did not exist by coincidence. The low Correlation Coefficient value in this study also occurs in the education, psychology and other social sciences studies (Mohamed Najib, 1999). Nevertheless, the findings of this study served as the starting point which can contribute towards important discoveries and can be used to establish theories (Burns, 2002:242).

Discussion

Using descriptive and t-test the analysis it was found that there was significant difference among the two groups of students. This means that students' achievements were significantly different for the two groups of teachers. Viewed from changes in students' achievements in both tests conducted according to subjects most teachers succeeded in raising the number of students who passed with excellence in EES, MES, CES and Engineering Drawing subjects. Nevertheless, for teachers with more 20 years of experience but did not attend in-service training they were also found to be successful in raising the number of students who passed excellently. This finding is parallel to the ones conducted by Porter and Lawler (1968) who said that one's experience in any one career can have an influence on his/her career performance. Experienced teachers are more sensitive and aware to the signals shown by their students' behavior and have thought and applied various teaching techniques in their teaching and learning processes (Elliot et al., 1996). They are also more flexible and able to maintain closer personal relationship with their students (Agnes, 1992).

Classroom context, school and the surrounding also influence the students' achievements (Research Matters, 2002). The Contextual Model for learning process at school as proposed by Biggs and Moore (1993) is shown in Figure 1. This model provides indicates that teaching and learning effectiveness of technical and vocational teachers' has an effect on their students' achievements. Meanwhile, the findings of this study show that the training attended by the teacher has significant relationship with the teachers' teaching effectiveness. However, the model proposed by Biggs and Moore (1993) does not contain any training element. As such, training element attended by the teachers must be considered in the Contextual Model because indirectly it will influence the students' achievements.

Analysis of the study reveals that there was significant and strong relationship between in-service training effectiveness attended with the teaching effectiveness of technical and vocational teachers either according to school or subject. It can

be concluded that in-service training attended by the teachers is very important in raising their teaching effectiveness. Analysis of the study reveals that SMT Batu Pahat had a high coefficient correlation value considering that SMT Batu Pahat teachers had the highest overall mean score in their teaching effectiveness. Meanwhile, SMT Segamat had the second highest overall mean score in teaching effectiveness and their teachers had the highest mean score value in technical skill related to the subjects they teach. When this happened, it means the teachers' teaching effectiveness score also increased. Improvement in skills is a most important aspect for the teachers to gain through in-service training programs in order to make them more effective.

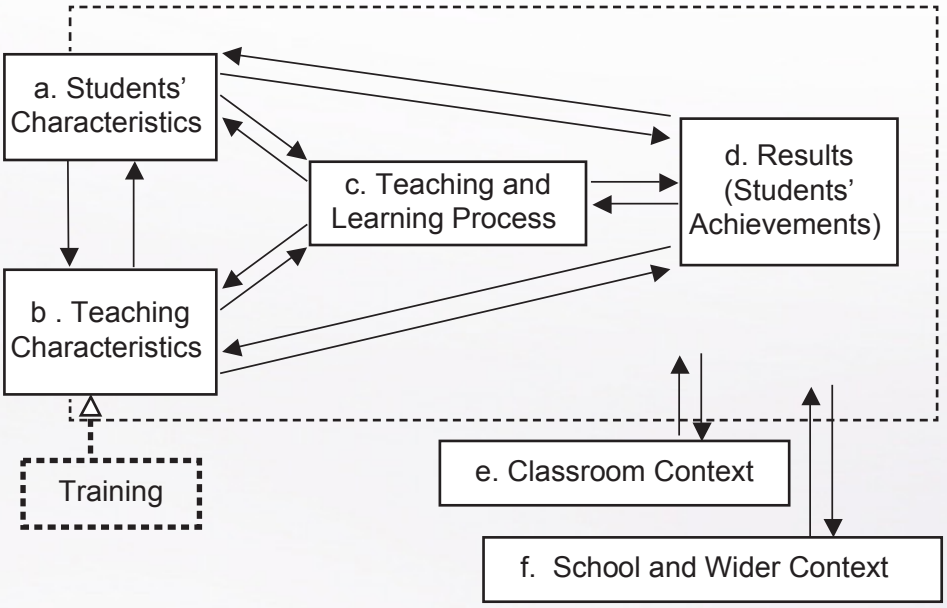

Figure 1 : Contextual Model for Teaching at School adapted from Biggs and Moore (1993) in Research Matter (2002:1)

Findings of the study also show significant relationship between teachers' teaching effectiveness with students' achievement at all schools involved. This is parallel to the findings of a study conducted by Ornstein (1990), Darling-Hammond (2002) and Zatta (2003). Their studies indicate that teachers' involvement in in-service training programs had positive relationships with the teachers' teaching effectiveness in carrying out their teaching tasks that led to significant relationship

with the students' achievements. Meanwhile, all the subjects involved in the study show positive relationship between students' achievement with teachers' teaching effectiveness. Nevertheless, the correlation coefficient for MES teachers was the lowest. Findings show that the MES teachers were less effective in motivating their students to carry out "hands-on" learning activities compared to the three other subjects.

Findings of the study reveal positive relationship between in-service training attended by the technical and vocational teachers with students' achievements for all the technical schools and subjects studied. In general, in-service training plays a very important role in raising the teachers' teaching performance and the students' achievements. The findings of this study show that there was significant relationship between in-service training with teachers' teaching effectiveness, students' achievements.

The study found most in-service training programs were implemented during school holidays that contributed to insufficient, less frequent and non-continuous training sessions. The school management and teachers felt that in-service training programs conducted during the school session interrupted the teachers' daily routines. As teachers at technical education institutions it is crucial that all the skills and knowledge learnt during the training period must be put into practice with their students at schools. The study also found that a number of technical and vocational teachers were not able to use the suggested teaching aids because they were not available at the school concerned. This situation should not be happening at technical and vocational schools considering that technical skills are crucial learning requirements. The effectiveness of training outcomes should be seen from the aspects of skills land knowledge learning application at the workplace (Fletcher, 1995). Such matter will result in cost wastage considering the huge amount of money spent for training program incurred. This problem can also have an effect on the teachers' motivation in achieving their objectives hence the organization they work at. One's feeling towards expertise in "self-efficacy" concept is very much related to motivation. This concept explains that personal expertise and beliefs that teachers can execute their tasks excellently will decrease when their motivation decreases (Blanchard and Thacker, 2004).

The in-service trainings attended by teachers also had positive relationships with their teaching effectiveness. This was crucial for raising the interest of the teachers towards the subject they are teaching and the teaching profession as well as raising self confidence. Nevertheless, the in-service training planned by the top brass was less helpful in developing interpersonal relationship skills among teachers and students, motivational and communication skills. There were several training aspects which were at a low score and this should be rectified. However,

it can be concluded that the in-service training program attended by the technical and vocational teachers had significant relationship with the teachers' teaching effectiveness for all schools and subjects studied.

Technical teachers need to attend continuous in-service training programs and should be able to improve in their teaching effectiveness. An effective training program will produce effective teachers and ultimately produce successful students. Students' performance at secondary technical schools also had significant relationship with in-service training attended by the teachers. Students' achievements are the most important outcome of any teaching and learning process. As such their performance is very much dependent upon the teaching effectiveness of their teachers who need to participate in the professional development programs like the in-service training programs.

Findings of this study prove that there were differences in information concerning teachers' teaching effectiveness at technical and vocational schools. Nevertheless, the perceptions of both parties focus on interest, skills and skill application, interpersonal relationship as well as counseling and guidance skills. Professional expertise like possession of technical skills, interest, dynamism and ability to relate concept with the students' daily life were considered by the technical and vocational teachers as the main characteristics required of them that should make them effective teachers. The students of technical schools considered their teachers had low interpersonal skills among teachers and students. Actually, interpersonal relationship must be viewed as one of the main characteristics in measuring teaching effectiveness. Due recognition, motivation and good guidance shown by teachers also form crucial elements that can help raise the teaching qualities of teachers in the classroom. It is also found that the teachers concerned lack counseling and guidance skills even though both these aspects form important elements in teaching effectiveness of teachers (Coker and Coker, 1988). Such skills are able to attract the students' interests towards their studies. Other than that, it was also revealed that the unavailability and lack of use of teaching aids led to ineffective teaching hence poor students' performance. "Hands- on" activities must be emphasized for all technical and vocational subjects. Teachers need to provide opportunities for students to develop their thinking, psychomotor and problem- solving skills especially in the use of technology in teaching (Norton and Wiburg, 2003)

If viewed from the perspectives of school and subjects, the findings show that SMT Batu Pahat had the most number of effective teachers compared to teachers from other technical schools concerned. Mean while. SMT Pontian reveals the most number of teachers with ineffective teaching. Other than in-service training, factors like experience plays a role in moulding the ability and professionalism of

teachers. Teachers teaching Technical Drawing subjects were identified as teachers with the highest level of teaching effectiveness but the situation was the opposite for EES teachers. Teachers' teaching effectiveness was supported by effectiveness in in-service training attended that led to positive relationship in the technical and vocational students' achievements.

Conclusion

The achievements of the students formed the major output in the learning process and indirectly it was due to the effectiveness of the in-service training attended by their teachers. As such, the assessment done on the in-service training under the Ministry of Education must be seen as a positive effort aimed at raising the standard of the existing programmed as well as to provide information in assessing the teachers' teachings and raise the learning outcome of the students. Technical and vocational teachers must be equipped with the appropriate knowledge and skills and are supposed to compete in the present and future education and job markets. It is hoped that the findings, conclusions and recommendations gained from this study will contribute towards improving the in-service training programmed, raising the teaching effectiveness of the teachers and ultimately the students' achievements.

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IMAGE AND STUDENTS' LOYALTY TOWARDS TECHNICAL AND VOCATIONAL EDUCATION AND TRAINING*

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Abstract

Many stakeholders have a poor perception towards career in technical and vocational field which needs to be improved in line with the national industrial development plan. The purpose of this study was to analyze the perceptions of secondary school students and apprentices of private institutes on the image of and their loyalty towards technical education and vocational training. The sample for this study was 356 form four secondary school students and 102 apprentices' from private training centres. Survey questionnaires were used to collect data for this study and correlation and regression analysis were used to analyse the data. The results indicate that school students and apprentices did not agree with the statement that technical students and vocational trainees had low academic

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interest, tend to be juvenile delinquents, problematic and have low interest in furthering their study to tertiary level. Apprentices have a better perception of the image of technical education and vocational training compared to secondary school students. Furthermore, secondary school students demonstrated low interest in continuing education and work in technical and vocational compared to apprentices. Recognition of qualification, work ethics, social values and applicability of course content are major predictors of students' loyalty towards technical education and vocational training field. Therefore, promoting and recognizing technical and vocational education and training (TVET) qualification, nurturing high-quality, knowledgeable and innovative skilled workforce with strong work ethics and good social values should be projected frequently especially through the electronic media.

Keywords: Image of Technical and Vocational Education, Loyalty, Student and Apprentices

Introduction

Technical education and vocational training (TVET) has been in the Malaysian educational system for nearly three decades. The establishment of technical and vocational schools and technical institutes across the country have spearheaded the government efforts in introducing technical education and vocational training to Malaysia's future generation.

In moving towards an innovative knowledge-based economy, Malaysia has recognized the importance of having more knowledge workers to support the technology-based work process in industries, improving productivity and continuing to attract foreign direct investment (Fong, 2006; Kanapathy, 1997; Malaysia, 2002, 2001a,b; Tan & Gill, 2000). In order to respond to the concern, the government has expanded resources for public vocational training institutes. The capacity and capability of the public vocational training delivery system are further strengthened to increase the quantity and the quality of skilled manpower. During the Seventh Malaysia Plan (7MP) 1996 – 2000, both public and private vocational training institutes produced a total of 187,440 skilled and semi-skilled manpower. The output of skilled and semi-skilled manpower from these institutions was to be increased to 301,859 in the year 2001 to 2010 (Malaysia, 2001b). The allocation for public vocational training was also increased from RM1.9 billion in 7MP 1996 – 2000 to RM3.8 billion in the Eight Malaysia Plan (8MP) 2001 – 2005 (Malaysia, 2001b).

The public vocational training institutes are managed by several ministries. The training institutes provide vocational training to secondary school leavers. Most secondary school leavers had taken the *"Sijil Pelajaran Malaysia"* (Malaysia Certificate of Education) at the age of 17 or 18 years old. In the vocational training system, more emphasis is given to practical work to develop competencies in trade skills as required by related industries (Ahmad, 2001). The duration of pre-employment programs varies, ranging from six months to 24 months in industrial skills. The core objective of technical education and vocational training programs is to develop both technical skills and non-technical skills such as work ethics, team work, communication skills and positive values so that they can be employed on a useful and productive basis (Ahmad, 2001). In total, there are 224 public industrial and skills based training institutes. The public technical education and vocational training institutional setting are as follows:

- Fourteen Industrial Training Institutes (ITIs) and apprenticeship scheme organized by Manpower Department and Human Resource Development Fund (HRDF) of the Ministry of Human Resources.
- Eleven MARA Vocational Training Institutes (MVTIs) and 130 Giat MARA centers under the Ministry of Entrepreneur Development.
- Fifteen Youth Training Centers (YTCs) under the Ministry of Youth and Sports.
- Twenty Polytechnics (POLYs) and 34 Community Colleges under Ministry of Higher Education.

The industrial and skills training institutes offer various programs at certificate and diploma level except for Giat MARA. Giat MARA provides training in basic skills for those who have left the school system early. Wood & Lange (2000) claimed that public training institutes often failed in equipping youths with relevant work related skills both in the UK and elsewhere. Therefore, training strategies were aimed at producing trainees with holistic thinking skills, innovativeness and in general to become more effective and productive workers, citizens and human beings to contribute to the knowledge-based economy (Malaysia, 2002, 2001a). The National Dual Training System (NDTS) was introduced in 2005 to strengthen national vocational training system where public vocational training institutes and private industries collaborate in providing training for trainees. The private industries focus on providing hands-on authentic experience, whereas training institutes concentrate on providing the basic and theoretical aspects.

Perception towards TVET

The survey done by City and Guild in nine countries (Australia, Canada, Denmark, Germany, Hungary, India, Malaysia, South Africa and the UK) found that with the exception of Hungary, the image of vocational training was seen by the people to be generally poor in these countries (The Guardian, 2008). In contrast, most employers attach a positive image to vocational qualifications in terms of work readiness and adequate ncome (The Guardian, 2008).

Many factors can influence a students' decision to pursue a vocational training programme. Image of vocational trainings is one of the factors that play an influential role in students' decisions to enroll in these programs. Parents as well as school counselors with their personal views can also influence a student's decision in pursuing vocational training. Unfortunately, many have negative view of vocational education as being a suitable educational path for low academic achievers and school drop outs who want to go directly into the workforce (Hoxter 2002). Also, vocational education is often considered suitable for high risk youths, and not having challenging curriculum (Beltram, 2007) as compared to the mainstream academic path in which most of the bright students chose to be in. These negative views can impact students' decision on whether or not to pursue vocational trainings which will impact a country's agenda on human recourse development.

Statement of the Problem

Despite various efforts undertaken by the Ministry of Education and a number of related agencies to promote and inform the public on the advantages and strengths of the existing technical education and vocational training system in Malaysia, most students and parents still prefer the academic stream rather than the vocational stream. Why does this phenomenon persist despite all the publicity done by the agencies? Do they really understand the system? It is therefore significant to understand and investigate on Malaysian students' and parents' awareness of technical education and vocational training in Malaysia.

Perception towards vocational training should therefore, be explored from various stakeholders. There are four main stakeholders in vocational training system. The four stakeholders are the learners and their parents, counselors, enterprises (employers) and training providers. The purpose of this study is to investigate the perception of stakeholders on the image of TVET with the interest to understand their influence on students' decisions to pursue vocational trainings.

Research Questions

1. What are the secondary school students and apprentices' perception of the image of technical education and vocational training?
2. To what extent does the image of technical education and vocational trainings' impacts students' career choice in the field?
3. To what extent does TVET's image related to students' loyalty to the program?

Methodology

The study used the survey design to determine the image and loyalty of secondary school students and apprentices of private institutions.

Population and Sample

The targeted respondents for the study were form four secondary school students and apprentices' of private enterprises. Based on a sampling frame by Krejie and Morgan 1970 (in Gay dan Airasian, 2000), the minimum sample size for each group is shown in Table 1. Public secondary school students and apprentices at private institutes were asked to evaluate the image of TVET and their intention to develop a career within the technical and vocational disciplines (loyalty).

Table 1: Targeted Respondent and Sample Size

Secondary School	Form 4 Students		Private Training	Apprentices	
	Population (N)	Sample (n)	Institutes	Population (N)	Sample (n)
Sek. Men. Keb. AU	150	108	Inst. A	95	76
Sek. Men. Keb. BU	75	65	Inst. B	28	26
Sek. Men. Keb. SA	120	92			
Sek. Men. Keb. SB	120	91			
Total	465	356		123	102

Instrumentation

The measurement of TVET's image (independent variable) and students' loyalty (dependent variable) was based on instruments that have been used in past studies and have been proven to have high reliability and validity. The image of vocational education scale (Gilbertson 1995; Pryor 1983; Wenrich and Crowley 1964) was adapted and blended with previous research (Alandas 2002; Dedeaux 2005; DeLese 2008; Falco 2006; Mclafferty 2006; Shelby 2005; Shultz 1969; von Yeast 2007; Welch 2004) to assess the image of TVET. Students' and apprentices' perceptions of the image of technical education and vocational training were measured by seven dimensions. These are low entry qualification, trainers' credibility, applicability of course contents, training facilities and equipment, recognition of qualification, future career potential, work ethics and social values.

We have considered five subjective measures of students' loyalty by asking their intentions on: further study, field of interest, priority to stay, career choice, family encouragement. A questionnaire was developed utilizing a five-point Likert scale with (1 = strongly disagree; 2 = disagree; 3 = somewhat agree, 4 = agree; 5 = strongly agree). Respodents were asked to provide the most appropriate response based on their experience and knowledge with pre-amble *"I believe technical education and vocational training……"* to the each statements. A corelation and regression analyses were used to determine relationships and the contributions each of image dimensions to the students' loyalty respectively.

Findings and Discussions

Respondents' Profile

This section presents descriptive statistics the background of respondents. Table 2 exhibits one-third (33.6 percent) of respondents were female. About two-thirds (65.1 percent) of the respondents were Malays, followed by Chinese (20.5 percent) and Indians (12.7 percent). In terms of academic stream, 43.7 percent of them were in economics, business and accounting and 38.9 percent were pure science students. Only 3.7 percent were in technical stream.

Table 2: Demographic Profile and Academic Stream

	Student		Apprentice		Total	
	Frequency	Percent	Frequency	Percent	Frequency	Percent
Gender						
Male	205	57.6	99	97.1	304	66.4
Female	151	42.4	3	2.9	154	33.6
Ethnic						
Malay	245	68.8	53	52.0	298	65.1
Chinese	61	17.1	33	32.4	94	20.5
Indian	43	12.1	15	14.7	58	12.7
Others	7	2.0	1	1.0	8	1.7
Academic stream						
Science	145	40.7	33	32.4	178	38.9
Economics, Business & Accounting	169	47.5	31	30.4	200	43.7
Agriculture	1	.3	6	5.9	7	1.5
Arts & Religious	19	5.4	14	13.7	33	7.2
Technical	2	0.6	15	14.7	17	3.7
Others	20	5.6	3	2.9	23	5.0

Parent Socio-Economic Status

Almost 61 percent and 58.8 percent of fathers of secondary school students and apprentices respectively hold secondary school qualifications. Only 17.6 percent of secondary school students' fathers and 15.4 percent of apprentices' fathers hold a diploma and university degree. Most of the secondary school students and apprentices surveyed have mothers with Malaysian Certificate of Education qualifications (equivalent to O Levels). Overall, three-quarters of the respondents have parents with relatively low educational background. Table 3 shows that not many parents with bachelor degree (2.0 percent), master degree (2.9 percent) and PhD (2.0 percent) allow their children to engage in apprenticeship programs.

Table 3: Parent Educational Level

	Student		Apprentice		Total	
	Frequency	Percent	Frequency	Percent	Frequency	Percent
Father's Educational Level						
Primary School	56	15.9	23	22.5	79	17.4
Lower secondary assessment (PMR)	50	14.2	13	12.7	63	13.9
Malaysian School Certificate (SPM)	141	40.1	40	39.2	181	39.9
Malaysian Higher Certificate Of Education (STPM)	23	6.5	7	6.9	30	6.6
Diploma	24	6.8	9	8.8	33	7.3
Bachelor Degree	15	4.3	2	2.0	17	3.7
Master	18	5.1	3	2.9	21	4.6
PhD	5	1.4	2	2.0	7	1.5
Others	20	5.7	3	2.9	23	5.1
Mother's Educational Level						
Primary School	50	14.0	22	21.6	72	16.1
PMR	48	13.5	14	13.7	62	13.8
SPM	155	43.5	41	40.2	196	43.8
STPM	25	7.0	7	6.9	32	7.1
Diploma	30	8.4	10	9.8	40	8.9
Bachelor Degree	13	3.7	5	4.9	18	4.0
Master	4	1.1	1	1.0	5	1.1
PhD	1	.3	1	1.0	2	0.4
Others	20	5.6	1	1.0	21	4.7

Overall, 36.7 percent of secondary students' and apprentices' fathers have monthly salary of less than RM1000. Only 5.9 percent have salary of RM3001-RM5000 and 4.9 percent were above RM5001. One- third of apprentices are from low income family, while 24.5 percent have salary between RM1001-RM3000 as shown in Table 4.

Table 4: Parent Monthly Gross Salary

	Student		Apprentice		Total	
	Frequency	Percent	Frequency	Percent	Frequency	Percent
Father's Monthly Gross Salary						
Less than RM1000[1]	127	37.5	35	34.3	162	36.7
RM1001-RM3000	80	23.6	25	24.5	105	23.8
RM3001-RM5000	19	5.6	7	6.9	26	5.9
RM50001 and above	17	5.0	5	4.9	22	4.9
Not sure	96	28.3	30	29.4	126	28.6
Mother's Monthly Gross Salary						
Less RM1000[1]	32	13.6	55	53.9	87	25.7
RM1001-RM3000	39	16.5	11	10.8	50	14.8
RM3001-RM5000	10	4.2	4	3.9	14	4.1
RM50001 and above	4	1.7	1	1.0	5	0.1
Not sure	151	64.0	31	30.4	182	53.8

Note: [1] included parent with zero monthly income

Streaming and Educational Information

Table 5 indicates that overall, the choice of educational stream was influenced most by teachers (38.5 percent), followed by own interest (32.9 percent) and parents (12.7 percent). However, when group statistics are compared, interestingly, an astoundingly high percentage of apprentices (83.3 percent) reported that interest was the main factor that influences their educational choice as opposed to only 14 percent of secondary school students who reported that interest played a dominant role in their educational decision.

With regard to source of information on TVET, internet (34.6 percent) was reported to be the main source followed by school counselors (18.8 percent) and friends or relatives (10.4 percent).

Table 5: Educational Choice and Source of Information

	Student		Apprentice		Total	
	Frequency	Percent	Frequency	Percent	Frequency	Percent
Educational choice						
Teacher's choice	155	43.5	3	2.9	158	38.5
Self interest	50	14.0	85	83.3	135	32.9
Parent's choice	48	13.5	4	3.9	52	12.7
School decided	30	8.4	7	6.9	37	9.1
Peer group	25	7.0	3	2.9	28	6.9
Source of Information						
Internet	116	44.8	24	23.5	140	34.6
Direct from college or institute	14	5.4	13	12.7	27	6.7
School counselor	66	25.5	10	9.8	76	18.8
Parent	14	5.4	12	11.8	26	6.4
Peer and relatives	31	12.0	11	10.8	42	10.4

	Student		Apprentice		Total	
	Frequency	Percent	Frequency	Percent	Frequency	Percent
Radio/TV	5	1.9	1	1.0	6	1.4
Newspapers	8	3.1	11	10.8	19	4.7
Magazines	3	1.2	20	19.6	23	5.7
Others	2	0.8	44	43.1	46	11.3

Note: Multiple choices.

Image of TVET

Table 6 depicts the mean scores for seven items on entry qualification, the first dimension of TVETs image. Form four students and apprentices recognized that TVET were accessible to all secondary school students including religious stream, low academic interest, low learning abilities and flexible entry requirements. However, both groups disagreed that TVET students were of low quality, juvenile delinquent, problematic and did not aspire to further their education to advanced or tertiary level.

Table 6: Low Entry Qualification

Item	Student (n=356)		Apprentice (n=102)	
	Mean	Std Deviation	Mean	Std Deviation
Access to all secondary school students	3.64	1.087	4.12	.978
Students with low academic interest	3.54	1.054	3.61	1.162
Students with low learning abilities	3.42	1.132	3.18	1.316
Low and flexible entry requirements	3.18	1.002	3.25	1.158
Low quality students	2.76	1.143	2.16	1.192
For juvenile delinquent and problematic students	2.57	1.235	2.32	1.212
Those who not aspire to higher level	2.55	1.126	2.21	1.238

Notes: Scale 1 = Strongly disagree, 2 = disagree, 3 = somewhat agree, 4 = agree, 5 = strongly agree.

Trainer credibility is a second dimension of TVET's image. Most of the respondents perceived their teachers and instructors were competent as shown in Table 7. However, secondary school students and apprentices had slightly low perception in terms of the ability of the school and institutes to provide well-qualified counselors to help students/apprentices develop their course plan.

Table 7: Trainer Credibility

Item	Student (n=356)		Apprentice (n=102)	
	Mean	Std Deviation	Mean	Std Deviation
Helpful teachers / instructors	4.06	.905	4.24	.858
Experienced teachers/ instructors	4.02	.916	4.27	.834
Provide 'real life' working experience	4.00	.874	4.46	.655
Help students develop their career plan	3.88	.928	3.92	.941
Qualified teachers / instructors	3.81	.903	4.11	.900
Help students develop their course plan	3.77	1.001	3.75	.909

Notes: Scale 1 = strongly disagree, 2 = disagree, 3 = somewhat agree, 4 = agree, 5 = strongly agree.

From the viewpoints of secondary school students and apprentices, TVET had provided specific job skills, interesting courses, combination of academic and skills, new technology, better career prospects and were more practical. Secondary school students held a slightly lower view of TVET as an alternative educational choice and foundation for continuing higher education as shown in Table 8.

Table 8: Applicability of Course Content

Item	Student (n=356)		Apprentice (n=102)	
	Mean	Std Deviation	Mean	Std Deviation
Specific job skills needed for career	4.16	.867	4.33	.871
Interesting courses	4.11	.856	4.10	.939
Integrate academic and skills	4.08	.868	4.16	.841
Preparation for technical and vocational college	4.05	.823	4.09	.785
Application of new technology	3.93	.851	4.38	.690
Provide interesting career prospect	3.91	.850	4.16	.780
Provide for a specific career	3.84	.860	4.27	.810
Offer courses that are more practical	3.83	.868	4.15	.849
Foundation for university education	3.69	.940	3.94	.854
Alternative education program for student	3.55	.990	3.62	.975

Notes: Scale 1 = Strongly disagree, 2 = disagree, 3 = somewhat agree, 4 = agree, 5 = strongly agree.

Educational institutions image consist of products and services provided to their clients. In terms of tangible assets (shown in Table 9), secondary school students and apprentices perceived TVET had a positive image. Compared to other aspects, TVET was perceived as not performing well in terms of financial support.

Table 9: Quality of Training Facilities and Equipment

Item	Student (n=356)		Apprentice (n=102)	
	Mean	Std Deviation	Mean	Std Deviation
Suitable laboratory/workshop	4.18	.865	4.40	.824
Advanced laboratory/workshop	3.95	.848	4.10	.970
Useful advance and latest technology	3.92	.888	4.10	.970
Sufficient space to support quality education	3.86	.890	4.14	.879
Doesn't need own expenses and yet is given education allowance	3.52	1.134	3.69	1.243

Notes: Scale 1 = strongly disagree, 2 = disagree, 3 = somewhat agree, 4 = agree, 5 = strongly agree.

Apprentices held a lower image of TVET's qualification recognition by local universities, overseas higher education institutions and local private companies as shown in Table 10. However, both groups realized that TVET's graduates were highly employable and earned on par with other academic qualifications.

Table 10: Recognition of Qualification

Item	Apprentice (n=102)	
	Mean	Std Deviation
Employable graduates	4.19	.909
Salary on par with academic qualification	4.12	.998
Recognized by foreign companies	4.03	1.067
Recognized by local private companies	3.93	.957
Recognized by local university	3.59	.968
Recognized by overseas higher education	3.58	1.121

Notes: Scale 1 = strongly disagree, 2 = disagree, 3 = somewhat agree, 4 = agree, 5 = strongly agree.

Table 11 indicates that secondary school students and apprentices were optimistic that TVET produced graduates with high future career and job potentials. However, the means of career selection, professionalism and job satisfaction were slightly low for secondary school students.

Table 11: Career and Job Potential

Item	Student (n=356)		Apprentice (n=102)	
	Mean	Std Deviation	Mean	Std Deviation
High skilled graduate for the nation	4.07	.879	4.31	.890
Easily advance in career.	4.04	.855	4.30	.768
Replace high skilled foreign workers	4.00	.943	4.25	.801
Able to integrate academic knowledge and technical skills	3.96	.866	4.22	.791
Challenging work with high satisfaction	3.86	.846	4.16	.898
A wide career selections	3.85	.888	4.12	.824
High level of professionalism	3.85	.901	4.19	.876

Notes: Scale 1 = strongly disagree, 2 = disagree, 3 = somewhat agree, 4 = agree, 5 = strongly agree.

Secondary school students and apprentices were confident that TVET was able to inculcate and produce graduates with responsible, independent, creative, innovative, self discipline, teamwork, leadership and ICT skills. However Table 12 shows the communication skills and entrepreneur curiosity were perceived to be slightly low.

Table12: Work Ethics and Social Value

Item	Student (n=356)		Apprentice (n=102)	
	Mean	Std Deviation	Mean	Std Deviation
Works responsibilities	4.24	.840	4.27	.956
Independent	4.22	.755	4.33	.958
Valuable citizen for society	4.21	.828	4.28	.837
Creativity and innovativeness	4.10	.838	4.10	.907
Teamwork skills	4.09	.836	4.25	.884
Self-discipline	4.08	.910	4.24	.935
Information technology and communication (ICT) skills	4.04	.877	3.86	.965
Leadership skills	3.97	.868	4.18	.801
Participation in community service	3.93	.893	3.97	.980
Communication skills	3.78	.885	4.06	.921
Inculcate entrepreneurship curiosity	3.77	.943	4.00	.867

Notes: Scale 1 = strongly disagree, 2 = disagree, 3 = somewhat agree, 4 = agree, 5 = strongly agree.

Apprentices perceived of work ethics and social values, future career and job potential, trainers credibility, applicability course content, training facilities and equipment, recognition of qualification of TVET were higher than secondary school students. Both groups of respondents had a neutral perception of low entry qualifications in TVET, as shown in Figure 1.

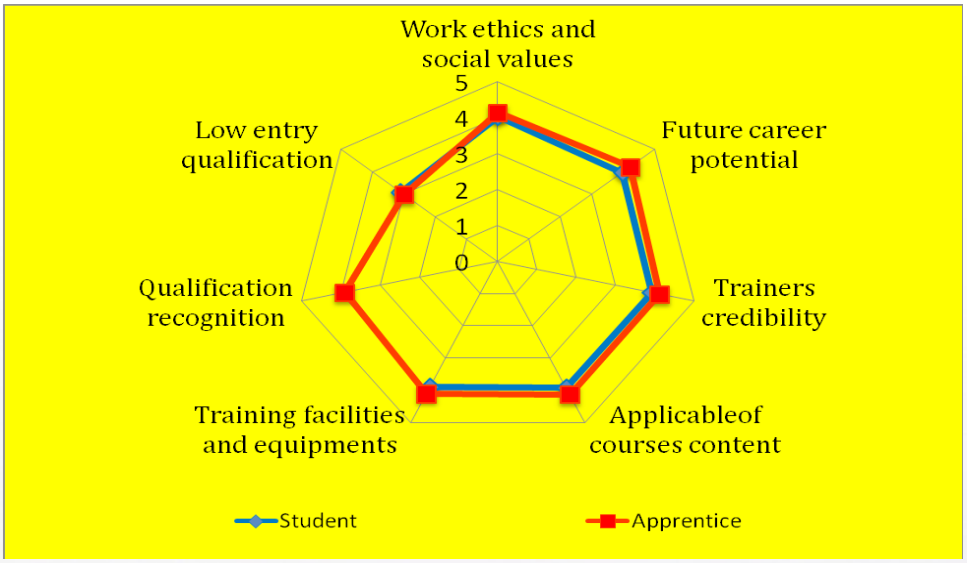

Figure 1: Overall Image Score

[Notes: Scale 1 = strongly disagree, 2 = disagree, 3 = somewhat agree, 4 = agree, 5 = strongly agree]

Student loyalty

The total score for students' loyalty is obtained from the summation of responses based on all the 5 item statements shown in Table 13. A higher mean indicates a higher level of students' loyalty and inversely, a lower mean indicates a lower level of students' loyalty. The items with the highest mean among secondary school students' and apprentices' loyalty are family encouragement (M=3.78; SD=1.161; M=4.42, SD=.776), intention to further studies in the field of TVET (M=3.65, SD=1.2; M=4.31, SD=.901) and TVET is their field of interest (M=3.62, SD=1.17; M=4.24, SD=.90). However, Table 9 shows priority field of study choice and career

preference for TVET exhibited slightly low mean scores. Overall, apprentices at private training institutes had higher loyalty than those at the secondary school.

Table 13: Students Loyalty

Item	Student (n=356)		Apprentice (n=102)	
	Mean	Std Deviation	Mean	Std Deviation
Family encouragement	3.78	1.161	4.42	.776
Further studies	3.63	1.211	4.31	.901
Field of interest	3.62	1.170	4.24	.903
Priority field of study choice	3.51	1.171	4.23	.866
Career preference	3.27	1.218	4.08	1.012

Notes: Mean classification: 1.00-2.32 = Low, 2.33-3.66 = Moderate, 3.67 – 5.00 = High

Image Impact on Students' Loyalty

Table A(in Appendix A) displays inter-correlations among the variables in the study. The correlations were consistent with the educational institutions' image and students' loyalty research. The coefficient correlations ranged between low relationship (r =.208) up to moderate relationship (r =.604). However, there was no significant relationship between low entry qualification and secondary school students' and apprentices' loyalty.

The equation of students' loyalty (SL) model,

$$SL = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \beta_6 X_6 + \beta_7 X_7 + \varepsilon$$

Dependent variable	Independent variable
SL = overall students' loyalty SL_1 = further study SL SL_2 = field of interest SL_3 = career preference SL_4 = Priority SL_5 = Parent encouragement	X_1 = low entry qualification X_2 = trainers credibility X_3 = applicable courses X_4 = training facilities and equipments X_5 = qualification recognition X_6 = career and job potential X_7 = work ethics and social values

Table B (in Appendix B) exhibits the results of the estimation of the multiple regressions for the models of TVET image impact on students' and apprentices' loyalty. The R-square for these models ranged from .155 up to .492, suggesting that about 15 percent to 49 percent of the variance in secondary school students and apprentices loyalty can be explained by TVET's image. Works ethics and social values, training facilities and applicability of course content were significantly related to almost each dimensions of loyalty. However, trainers' credibility [β=0.360, ρ<.05; β=0.370, ρ<.05] was significant and had a positive relationships to the apprentices' priority and their parents' encouragement. Meanwhile, low entry qualification was not a significant predictor of loyalty dimensions except secondary school parent encouragement [β= -0.218, ρ<.05]. Recognition of qualification is considered significant predictor to the apprentices field of interest [β= -0.354, ρ<.05], priority field of study [β= 0.413, ρ<.05] and parent encouragement [β= -0.253, ρ<.05].

The basic assumption of this study was that TVET's image was significantly related with secondary school students' and apprentices' loyalty. The overall image impact in secondary school students' loyalty showed a strong statistical significance, with ρ<0.001 and the R-square of 0.224. Multi-colinearity does not appear to be a serious concern in this model since the variance inflation factors (VIFs) for these variables are below

3.0 (Hair et al., 1995). The regression model indicates that TVET's image explained 22.4 percent of the variance in secondary school students' loyalty. However, applicability of course content, career and job potential were dropped in apprentices' loyalty model due to high multi-co linearity. Almost 50 percent of the variance in apprentices' loyalty was explained by this model. Table 15 shows that recognition of qualification [β=0.292, ρ<.05], work ethics and social values [β=0.238, ρ<.10: β=0.543, ρ<.001] and applicability of course content [β=0.337, ρ<.05] were positively related to the dependent variable (loyalty).

Table 14: Overall Image Impact on Students' Loyalty

Independent variables	Student		Apprentice	
	β	t-value	β	t-value
Constant	.065	.141	.633	1.406
Low entry qualification	-.173*	-1.909	.070	.824
Trainers credibility	.021	.216	.229	1.646
Applicable courses content	.337**	2.341		
Training facilities and equipment Qualification recognition	.273**	2.498	-.224* .292**	-1.963 2.520
Career and job potential	.154	1.211		
Work ethics and social values	.238*	1.884	.543***	4.321
F	16.773		18.045	
R^2	.224		.484	
N	356		102	

Notes: *** p < .001, ** p<.05, *p<.10

Conclusion

Secondary school students and apprentices disagreed that TVET students are of low quality, delinquencies and problematic with low aspiration for further study. The findings indicated that apprentices tend to have better perception of the image of TVET than secondary school students. With regards to future intention, secondary school students demonstrated a lower loyalty to future TVET career compared to those at private training institutions. The results of the multiple regressions revealed that the images of TVET are directly related to students' loyalty which is consistent with previous empirical research. Recognition of qualification, work ethics and social values and applicability of course content were considered major predictors of students' loyalty. Therefore, efforts must be given in promoting TVET.

Recognition of qualification in technical education and vocational training, capability to produce high quality manpower with knowledge and capability, innovative, strong work ethics and social values should be promoted widely through the electronic media. Furthermore, the annual technical education and vocational training expos organized at the district and state levels by the Department of Technical Education and Vocational Training, Ministry of Education should be used as avenues to attract and encourage secondary school students to enroll in TVET. Public perception of technical and vocational education can be improved via documentary films on career success, mobility and job security among Malaysian Skill Certificate (SKM) holders who are working in Malaysia as well as abroad. With current facilities and expertise as well as the locals of the government on TVET all related government departments and ministries should take the opportunity to disseminate this information to attract more youths to enroll in TVET. In line with the intention to boost the number of SKM holders pursuing higher education, the "*Unit Pusat Universiti* (UPU)", Ministry of Higher Education must state clearly SKM level 3 and SKM level 4 are eligible for entry to university. Lastly, although this is a story from Malaysia, the experience of Malaysia in implementing and managing TVET may be relevant and of value to TVET managers in other parts of the world especially those countries that possess similar cultural and economic background as Malaysia.

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Appendix A

Table A

Image	Further Study		Field of Interest		Career Preference		Priority		Parent	
	Student	Apprentice	Student	Apprentice	Student	Apprentice	Student	Apprentice	Student	Apprentice
Low entry qualification	.039	.138	-.015	.110	-.010	.051	.030	.188	-.032	.149
Trainers credibility	.322**	.374**	.266**	.390**	.228**	.451**	.230**	.553**	.208**	.545**
Applicable courses content	.403**	.479**	.374**	.484**	.361**	.535**	.333**	.595**	.282**	.498**
Training facilities and equipment	.389**	.319**	.352**	.239*	.317**	.381**	.344**	.439**	.325**	.414**
Qualification recognition		.453**		.466**		.458**		.590**		.524**
Career and job potential	.360**	.542**	.344**	.560**	.320**	.567**	.329**	.604**	.346**	.599**
Work ethics and social values	.389**	.579**	.337**	.551**	.320**	.533**	.313**	.635**	.332**	.565**

Note: *** $p < .001$, ** $p<.05$

Appendix B

Table B

Independent variables	Further Study		Field of Interest		Career Preference		Priority		Parent Encouragement	
	Student	Apprentice	Student	Apprentice	Student	Apprentice	Student	Apprentice	Student	Apprentice
Constant	-.701 (-1.304)	1.000 (1.754)	.143 (.270)	.978 (1.739)	.258 (.480)	1.090 (1.914)	-.239 (-.426)	-.843 (-1.470)	.862 (1.613)	.941 (1.976)
Low entry qualification	-.114 (-1.076)	.102 (.954)	-.219** (-2.096)	.052 (.491)	-.202* (-1.904)	-.023 (-.215)	-.110 (-.992)	.144 (1.339)	-.218** (-2.066)	.073 (.821)
Trainers credibility	.140 (1.211)	-.001 (-.007)	.033 (.286)	.188 (1.083)	-.044 (-.376)	.227 (1.293)	-.004 (-.033)	.360** (2.032)	-.019 (-.164)	.370** (2.518)
Applicable courses content	.368** (2.182)		.430** (2.585)		.502** (2.976)		.313* (1.776)		.070 (.415)	
Training facilities and equipment	.323** (2.520)	-.208 (-1.438)	.266** (2.108)	-.443** (-3.110)	.196 (1.531)	-.096 (-.663)	.319** (2.379)	-.228 (-1.567)	.260** (2.040)	-.146 (-1.208)
Qualification recognition		.222 (1.516)		.354** (2.451)		.216 (1.475)		.413** (2.803)		.253** (2.069)
Career and job potential	.039 (.265)		.139 (.947)		.130 (.873)		.170 (1.096)		.289* (1.955)	
Work ethics and social values	.318** (2.144)	.724*** (4.551)	.186 (1.275)	.665*** (4.242)	.198 (1.336)	.438** (2.759)	.180 (1.165)	.562*** (3.515)	.307** (2.086)	.324** (2.442)
F	16.152	11.083	13.205	12.079	11.328	8.871	10.648	18.572	10.930	13.040
R^2	.217	.366	.185	.386	.163	.316	.155	.492	.158	.404

Note: *** $p < .001$, ** $p<.05$, *$p<.10$ and figure in brackets are t-value.