

## HIGHER TVET EDUCATIONIN AVIATION: TEACHING QUALITY AND A MASTER KEY TO INDUSTRY 4.0

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**Accepted date:** 29 July 2017

**Published date:** 2 October 2017

### **To cite this document:**

Rahman, N. A. A., Kadir, S. A., Mohammad, M.F., & Moin, M. I. (2017). Higher Tvet Educationin Aviation: Teaching Quality and a Master Key to Industry 4.0. *International Journal of Education, Psychology and Counselling*, 2(5), 44-53.

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**Abstract:** It is acknowledged that the 4<sup>th</sup> Industrial revolution or also known as Industry 4.0 had already worked out. As such, the shift of teaching style from the traditional system to a more flexible and open is required to facilitate fast changing requirement for business and production sector. Again, the teacher or the instructor plays a significant role in maintaining the teaching quality. The purpose of this conceptual paper is to shed light on the importance of teaching quality in higher technical and vocational education and training (HTVET) in supporting the 4.0 industry in the aviation sector. This exploratory study suggests there are three main components that could affect teaching quality of instructor in aviation HTVET field namely personal attributes, educational background and cognitive ability. This paper enhances current knowledge in HTVET and TVET in Malaysia perspective and aviation sector.

**Keywords:** HTVET, TVET, Aviation, Aviation education, Teaching Quality, Industry4.0

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### **Introduction**

Higher technical education plays a significant role in supporting human capital development in any industry across the globe. Technologist and technicians are recognized as the pillars of sources who will determine our future economy growth and the success of the forth industrial revolution (Industry 4.0). Malaysia Government through the National Transformation Plan 2050 (TN50) is shaping the future of Malaysian country for the year 2020 to 2050 through emphasizing on the value of high technology. Important to note that the industry 4.0 is not only about advances in technology, but most importantly advancement in learning process especially at the tertiary level or also known as HTVET. In strengthening our human capital, it is important for instructor to assess both students skills and mindset to be employable by also looking at their social engagement and also personal traits.

Essentially, the success of higher technical and vocational education and training (HTVET) is related to the quality of the teacher or instructor at the higher education where it is related to

how the delivery by the instructor can meet the target (Pazagadi et al., 2005). The development of technical and vocational education (TVET) are becoming popular to both international and national policy; and also to both developed and developing country. This is because it is market driven and most importantly to support the emergence of industry 4.0. As been recognised, industry 4.0 or also known as 'internet of things' will create intelligent manufacturing where it is related to automated machining in production process where skills is regarded as the core component for industry employment. As such, teachers or instructors plays significant role to ensure that the students they are producing is marketable and able to face the technology challenges to support new government blueprint on National Transformation 2050 or known as TN50. Students that we produce should be ready to serve our nation with regard to domestic economy, prosperity and innovation.

In aviation industry 4.0, the value of technology is highly emphasised. Industry sectors in aerospace particularly are natural adopters of cutting edge technologies apart from transportation, automotive, telecommunication, electrical and electronics. This is the only way they can remain relevant and competitive. In 2020, it is expected that 60% of 1.5 million jobs would require skilled workers. Unfortunately, for Malaysia to achieve its goal, skilled human resource is still lacking. Having identified this as a main issue in our education system, the government through Budget 2017, has allocated a total of 4.6bil to focus on TVET education, with RM 270 million is allocated to upgrade educational equipment in TVET institutions, while RM 360 million has been allocated for the Skills Development Fund Corporation. This is aligned with Education Blueprint 2050. Malaysian Universities are also ready for Industry 4.0 by way of course offerings with integrating industry people.

The government also has set up MBOT or Malaysian Board of Technologist. This body plays an important role to support the government agenda in ensuring the availability of skilled workforce to meet the industry's needs. As such, the boundary of technologist / technician profession is enlarged so that a more industry based technology including aviation, agro based technology, transportation, and logistics technology, material science technology, are well matched with the fields that are conventionally associated with MBOT.

Historically, TVET has emerged from opposing traditions, where the universities providing academic knowledge while TVET providing skills for employability. TVET can ensure viable career for those who do not excel in the mainstream academic line (Omar, 2015). Previously, it has been called as apprenticeship training, vocational education, technical education, technical-vocational education, occupational education, workforce education, workplace education, and others. HTVET is a combination of both academic and skills where in the long run, increase the employability of the students.

In the 21<sup>st</sup> century, the success of any organization is not only dependent to the product and services offered, but also dependent to the resources that the company have such as labour or also known as workforce. Therefore, workforce skills play a significant role for business sustainability. This is align with Industrial Organization View Theory; where it mentioned and emphasizes that internal factors in particular workforce is much more important compared to external factor in order for organization to sustain and achieve profitability. In fact, it is also acknowledged that skills are vital in any country to reduce poverty, for economic recovery and sustainable development (Abd Hamid et al, 2012).

The development of HTVET policy in education field is growing across the world including Malaysia. As stated in Tenth (10<sup>th</sup>) Malaysia Plan, Malaysia requires 37 percent of its workforce

to be “highly skilled” by 2015. Consequently, in Eleventh (11<sup>th</sup>) Malaysia Plan (2016-2020), according to the Economic Planning Unit (EPU), the demand for labour especially for the TVET sector is expected to increase with the introduction of National Key Economic Area (NKEA). NKEA will require a workforce of up to 3.3 million by 2020 of which 1.3 million are to be TVET graduates. Transformation of TVET into HTVET is a determination of re-engineering the existing vocational education system to build a new system of higher vocational education; which will contribute to the high-income country, parallel with the emergence of industry 4.0. In fact, Malaysia has identified the aerospace industry as a strategic industry which has a wide potential in the country's industrialization and technological development program (Fakhrulnizam and Rahman, 2015). To ensure consistent growth of the industry, the Malaysian Aerospace Industry Blueprint 2030 was launched in March 2015 by the Prime Minister of Malaysia during the Langkawi International Maritime & Aerospace Exhibition 2015 (LIMA '15). Realizing this significant role, the Malaysian government including government link company such as Majlis Amanah Rakyat (MARA), as well as private training and education institutions is taking various measures to increase TVET through providing HTVET education at tertiary level where emphasising on the hands on and skill development.

In supporting HTVET education in Malaysia, there are seven ministries involved namely Ministry of Education, Ministry of Human Resource, Ministry of Youth and Sports, Ministry of Agriculture, Ministry of Defence, Ministry of Works and Ministry of Rural Development (see Table 1). As tabled in Table 1, different ministries manage their own TVET institutions and there are diverse standards of performance with limited authority and responsibility.

**Table 1: Seven ministries involved in HTVET education in Malaysia**

<b>Ministry</b>	<b>Institutions</b>
Ministry of Education	Jabatan Pendidikan Tinggi – Basic Vocational Education(BVE), Vocational College (VC), POLYTECHNICS
Ministry of Human Resource	Pusat Latihan Teknologi Tinggi (ADTEC), Institut Teknikal Jepun Malaysia(JMTI), Institut Latihan Perindustrian (ILP)
Ministry of Youth and Sports	Institut Kemahiran Belia Negara (IKBN), Institut Kemahiran Tinggi Belia Negara (IKTBN)
Ministry of Agriculture	Majlis Pertanian Latihan Kebangsaan (NATC)
Ministry of Defence	Institut Perbadanan Hal Ehwal Bekas AngkatanTentera (PERHEBAT)
Ministry of Works	Construction Industry Development Board (CIDB)
Ministry of Rural Development	MARA (GIATMARA, IKM, IKTM, GMI, UniKL)

In realising this significant role, teacher or also known as instructor is recognised as the most resourceful person to ensure the success of HTVET. This is because most content experts share their knowledge through writing, lectures, expertise and experiences. When they instruct, they appear as the “sage on the stage” imparting all knowledge to a passive participant. They are

known as content resource. They control what is taught and when it need to be taught. As suggested by Wilder (2012), it is up to the participant to adapt their personal style and prior knowledge to learn new skills and knowledge.

What is more, at present everybody are talking about industry 4.0 or also known as ‘smart manufacturing’ or ‘industrial internet’. The manufacturing industry has transformed to fourth revolution expected to affect entire industries by transforming the ways of goods been designed, produced, delivered, paid and consumed. As a result, education need to be the focus specifically in technical and vocational. This is because the world has realised that time is changing, and TVET and skills is at accented stage. If the education is significant for the development, TVET is a master key to support industry 4.0. As such the instructor plays a significant role to support this to be a successful journey that will support the industry and economic growth. The creativity, the innovation and the entrepreneurship skills also need to be included in the teaching in order to ensure our Malaysian country are ready to serve with 4.0 industry skills. This are all reflected to the quality of teaching by the instructor or lecturer.

From a review of the past studies, there are number of researches being undertaken into workplace learning focusing on the student or trainee, with little attention given to facilitator or instructor (Ellinger and Cseh,2007;Ghonji et al, 2015; Koopmans et al., 2006; ). In fact, there are also a number of studies that looks into TVET education but not many on HTVET especially in aviation context. This shows the rationale of this study that investigates on HTVET in aviation field which is rarely explored and it is significant to the Malaysian economic growth.

Despite the increasing recognition given to the important role of teacher or instructor play in enabling or constrain learning in HTVET, therefore this study aims to look into the factors that contributes to the teaching quality of instructor in realizing HTVET in aviation education. As such the following research question is developed:

*What are the critical factors that contribute to instructor teaching quality in aviation HTVET?*

## **Literature Review**

### ***HTVET instructor in aviation field: Flying vs Ground school***

Instructor is one of the main character that can contribute to the safety of the aviation industry. Instructor known asa person who have certain qualification or experience to enable them to teach and to facilitate the student under his/her supervision. The reason why instructor are important to the aviation industry is their proper and qualified certification as well as their experience. In other word, the instructor isa person that usually deliver the course syllabus, followed by discussion of its meaning to students; explain the place of course in the curriculum and ways that content from other sequences, including field work, and integrated into practice (Northen and Weil, 1995).

In aviation education, it can be divided to two main categories namely flight school and ground school. Fight school refer to flying academy. In Malaysia, there are numbers of flying academy such as Malaysia Flying Academy (MFA), Asia Pacific Flight Training (APFT) and HM Aerospace (HMA). For instance, MFA offered course for private pilot license, commercial pilot license, air transport and assistant flying instructor (MFA, 2017). While APFT is one of flying academy based at Sultan Ismail Petra Airport in Kota Bharu, Kelantan. The school started

training students in 2005 and was officially opened in 2006 (Tan, 2006). APFT offers courses leading to the airplane private, commercial and airline transport pilot licenses and multi-engine, instrument and assistant flight instructor ratings. The school also offers a Diploma in Aviation (Pilot Training), which is approved by the Malaysian Qualifications Agency (APFT, 2009). HMA is another flying school in Malaysia that has a good reputation in training cadet pilot. It established in 2005 and was located at one of the famous islands in Malaysia, which is Langkawi Island in Kedah. HM Aerospace Sdn Bhd (HMA) is Malaysia's Premier Flight Training Academy providing world-class training and facilities for cadet pilots. As a member of Halim Mazmin Group, HMA has the capacity to train a minimum of 200 cadet pilots per year at their Langkawi facilities (Afterschool, 2017).

Ground school is a classroom type instruction, generally to more than one person, covering items to be taught in the curriculum. This prepares the student for the written examination, although instruction may also be extended to cover the air exercises. Many people only understand that the ground school is only for pilot student before there were able to go for solo flight but less people know that ground school also is a term for people who learn about aviation that will work in the land based. It is mean that it is not the pilot but the engineer, technician, as well as aviation management considered as the ground school for students before they qualified and able to work in aviation industries. For instance, Universiti Kuala Lumpur (Malaysian Institute of Aviation Technology) is one example of aviation ground school that is offering Aviation Management program and engineering technology. Others such as Cybernetics College, Admal College, and Malaysian Aviation Academy (MAVA) are also an example of ground school in Malaysia providing related courses in aviation.

### ***The importance of instructor in aviation HTVET***

The instructor serves as a resource to the student teams. The instructor is frequently acts as a mentor or tutor to the group. The instructor relinquishes the role of the dispenser of information. The instructor is most active in planning the content and sequence of projects, providing immediate feedback on student work and discussion, and evaluating students (Samford, 2017). The reason why instructor are important to the aviation industry because of their experiences and proper qualification make it better combination for students entering to the industry. It is also proper in securing the aviation industry and ensuring the compliances. Figure 1 below shows the Boeing and Commercial Aviation Safety Team or CAST statistic. It shows that from 2005 to 2014 the causal factor of all fatalities in commercial aviation operation causes by several of occurrences. One of the factors that can cause fatalities is lack of information and teaching material given by the instructor to the students. Finally, it can cause the accident that is human factor itself. Therefore, it is important to have a quality and experience instructor to teach the students on all the aspects that related to aviation.

# Fatalities by CIGTT Aviation Occurrence Categories

Fatal Accidents | Worldwide Commercial Jet Fleet | 2005 through 2014

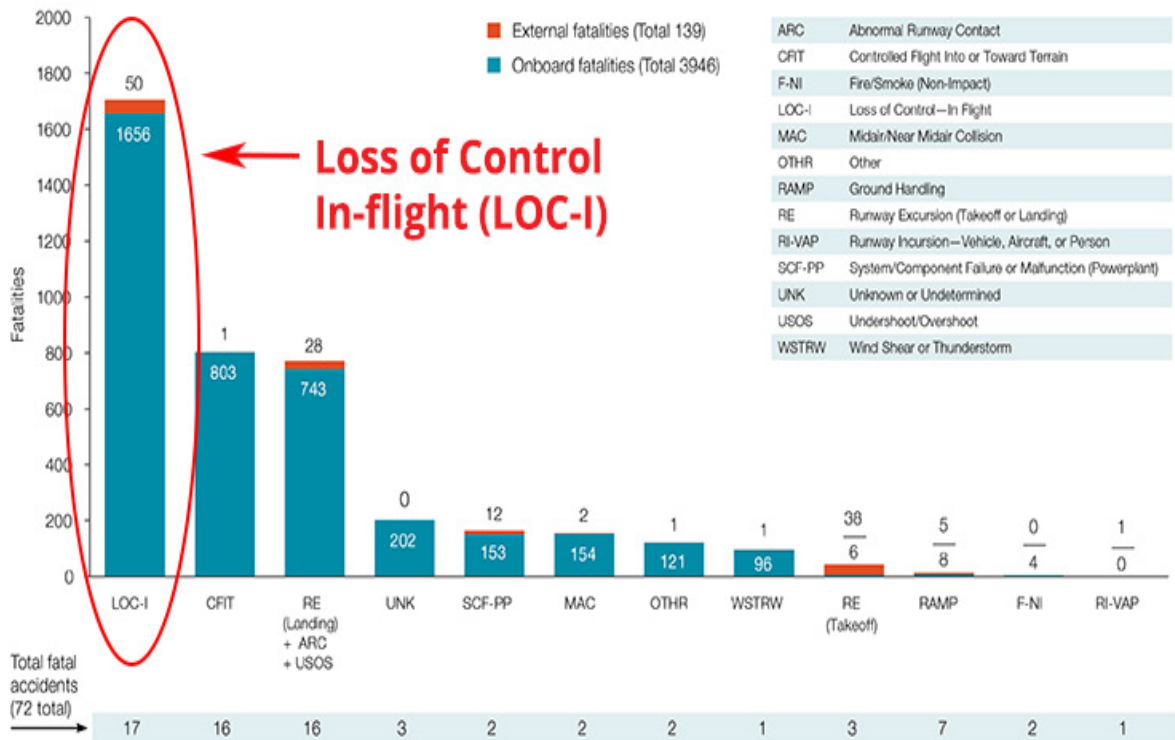
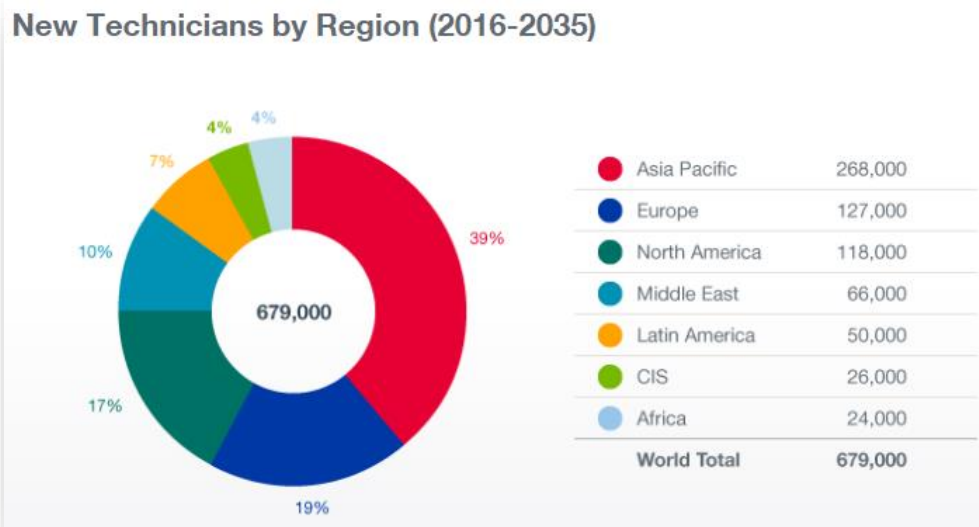


Figure 1: causal factors for fatalities in aviation

Source: CAPA (2014)

Align with the previous discussion above, Boeing Aircraft Company (2016) reported that there is a growing need, a very real urgent demand for new and competent aviation personnel globally; in particular, Asia Pacific Region is also affected as shown on Figure 2 below. In Figure 2, the industry forecast vacancies and new opportunities for 190,000 new commercial airline pilots and 220,000 new technicians in the Asia Pacific Region (including Malaysia) towards 2032. This shows a significant strong demand for aviation personnel in the future. As such, it justifies this study that focus on HTVET in aviation education.



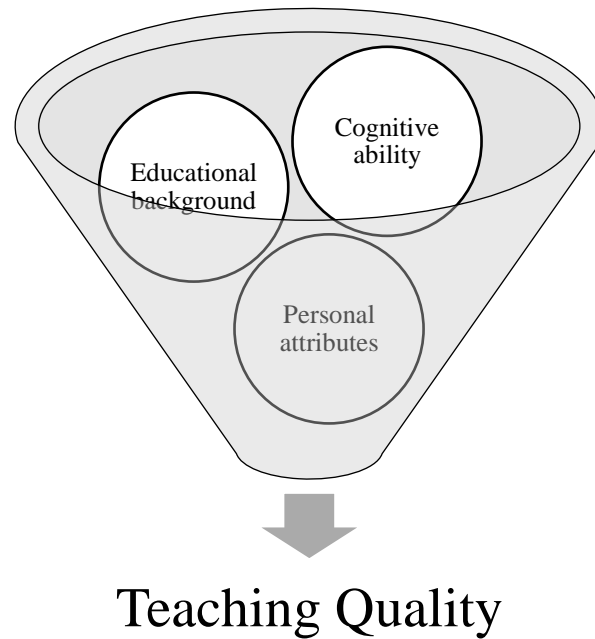
**Figure 2: Aviation technician needed globally**

Source: Boeing (2016)

In the classroom, teachers should act as meta cognitive coaches, facilitators where they serve as models, thinking aloud with students and practicing behavior they want their students to use (Abdul Hamid et al, 2012; Stepien and Gallagher, 1993). It is the job of the instructor to be aware of the progress and conversations within the groups; so that students continue on fruitful paths. As suggested by Schmidt et al (2010), instructor should provide unstructured time in the class in order to allow the students to assemble in their teams, work with resources, contact and meet with faculty members who may be helpful to their project, and accomplish other tasks necessary in the resolution of the problem.

### ***Teaching quality and HTVET instructor in supporting industry 4.0***

As mentioned earlier, HTVET is an innovative education model which embodies the spirit of democratization of knowledge and champions the continuous advancement of science, technology and trades. Instructor plays important roles in influencing student's academic excellent and performance. It is significant to have good and experienced instructor to expose students with the real situation in the field (Wayne and Youngs, 2003). At present, the role of instructor has changed from instructor centered to student centered. . Harris and Rutledge (2007) proposed three predictors of instructor quality namely cognitive ability, personality attributes and educational background as illustrated in Figure 3 below.



**Figure 3: Three main factors on teaching quality**

Cognitive ability referred as instructor’ abilities to carry out any task and it is related with a mechanism of how students learn, pay attention and how instructor organize the classroom and manage their students’ behaviors (Oliver and Reschly, 2007). Personal attribute is a quality or characteristic of an instructor. Earlier study by Danili and Reid (2016) shows that personality traits of teachers have a strong relationship with students’ performance. This is also supported by a study from Ozel (2007). Instructor teaching quality is not the same as any other job related areas but it also requires religious value, moral and teaching ethics. On the same note, they suggest that educational background refer to the extent of formal education that the instructors have obtained from primary, secondary and tertiary level (Voss et al, 2007).

With that, this study posit the following propositions:

P1: Cognitive ability of instructor is significantly affect aviation HTVET success

P2: Personal attributes of instructor is significantly affect aviation HTVET success

P3: Educational background of instructor is significantly affect aviation HTVET success

## **Conclusion**

This conceptual exploratory study gives a valuable insight into aviation teaching in HTVET education in Malaysia. This study offers contribution by enhancing current knowledge on HTVET by looking at three main components of teaching quality among the aviation instructor namely educational background, personal attributes and cognitive ability. These three components regarded as three main component in preparing HTVET graduates in facing Industry 4.0. This study will also improve current knowledge on HTVET by revealing the three construct and their parameters. This study is among the pioneer study that looks into HTVET issue in aviation industry at tertiary level, specifically in Malaysia.



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