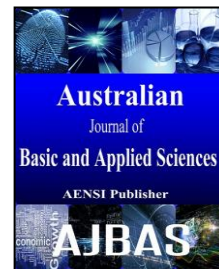




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Trainers' Perception on Students' Preparedness for the Workplace in Mechanical Engineering (Automotive)

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ABSTRACT

Background: Automotive industry has grown a lot in a recent year due to the markets demand and rapid changes in technology. The enormous development of cars production has changed the pattern of labor requirement in term of skills and knowledge needed in the workplace. On this issue, training institutes are required to produce workers who are globally competitive and can cope with the new technologies. The purpose of this study is to investigate and at the same time trying to understand the phenomenon of the students' preparation for the workplace in mechanical engineering (automotive). It addresses responses from the trainers' perspectives regarding the knowledge and skills transferred by investigating the condition of the training process at the institutes. There were six participants involved in this study. This study was carried out using the qualitative method approach by taking place in six Giat MARA Institutes in the state of Johor Malaysia. Individual interviews were implemented for the data collection. The findings provide the trainers view of a variety of needs. The key issues include diversification of educational approaches, expanding partnership with the branded automotive industry, knowledge and skills upgrading among the trainers and update of the training facilities. The findings also asserted that the development of curricula must be relevant in term of the trainees, substantives outcomes and toward technological development in the automotive industry. The best practice in developing a quality VET programs is by involving all stakeholders in the curriculum design to ensure the future training program is comprised of technological change in the industry.

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INTRODUCTION

Automotive industry is an area of growing importance today in many countries. For many years in Malaysia, it was uncommon to see average people with luxury items such as cars. However since the enormous development in the automotive industry around the world, mass production of cars drastically changed the ways people think about cars as transportation. The importance of cars in the development of economies is directly connected to technology development in a country. The production of cars is a symbol of Malaysia's technological contribution to its global economic position. In the modern world, the development of automotive technologies is essential in facing a range of 'workforce development' issues (Manufacturing Skills Australia, 2009). These issues include industry restructuring, changing technologies and emerging environmental agendas for future automotive employment requirements.

Nowadays, Malaysian automotive industry has grown a lot in recent years. According to Malaysian-German Chamber of Commerce and Industry (2010), Malaysian automotive industry was catalyst to support the growth in the manufacturing of component parts and accessories. The major objective of support for the 'automotive industry constituted to the limitation of imports, the reduction of expenses in foreign exchange, the creation of employment and the development of industrial sector' (Malaysian-German Chamber of Commerce and Industry, 2010).

Despite the fact that the evolution of the automotive industry is booming worldwide, it cannot be separated from the educational system that are responsible in providing trained human capital that meets the need of employment sector. This has led to escalate interest in understanding of the process and mechanism that facilitate the transfer of knowledge and skills among students. Writers such as Zarinpoush *et. al.* (2007) stated that the overall goal

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of knowledge and skills transfer is intended to reduce the gap between knowledge/skills and practice. In the context of TVET, this include by increasing the trainees capacities to apply knowledge/skills, prompting cooperation among the knowledge producers and users, integrating knowledge and skills into the decision-making process and encouraging a cultural shift within an organization of practice.

Generally, trainers have the main responsibility in the process of knowledge and skills transfer to the trainees through guidance and supervision. Williams Group (2003) states that the effectiveness of knowledge and skills transfer is when this process has been successful in helping to improve the practices and situation with a positive impact and not just an end in itself. It means that the trainees are able to apply the knowledge and skills gained from the training process back to their jobs. Typically, people learn best by "doing". For that reason, the trainees should have the opportunities to reflect, act and interact on the received knowledge and skills during the training process.

Moreover, collaboration among the training institutions and industry indirectly promote the transfer and exchange of knowledge and skills that is current, relevant and up-to-date. This supports the views of Norman and Huerta (2006) that stated that the knowledge and skills transfer occurs in the context of relationships. Without doubt, collaborative environment results in stronger link to the both parties and at the same time generate continuity of knowledge and skills transfer which will benefit the development of the training program at the institutes.

Research Background:

Technological development is closely related to the job demand and high labour requirements. Correspondingly, the need for highly skilled and talented workers is increasing from time to time. As a matter of fact, employers nowadays tend to choose the person who has good skills to fulfil the industry requirement (Fitriahara, 2008). In the past, many students have successfully gained employment after completion of their study. In fact, intensive training was given to the employees in order to enable them to adapt to the condition in the workplace (Nurul Nadia, 2013). However, the evolution of the industry has changed the patterns of labour requirements. The unemployment rate is increasing as employers now have set the specific requirements that must be met by the graduates to be accepted in industry (Siti Nur Rohazrien, 2013). Despite that, some employers argue that graduates from higher-education programs do not meet the industry's needs. Recently, there have been discussions about skills mismatches in the new era of the knowledge-based economy. Based on Hawkins (2002), there are three aspects of skills that graduates of technical vocational education and training (TVET) should have including the technical

skills, employability skills and the specific skilled that are required by the industry.

Actually, Malaysian automotive industry is still far behind compared to developed countries like Japan, German, Korea and the United States. Japan for example is the largest car manufacturer and exporter in the world. This country has six out of ten of the world's biggest car manufacturer such as Toyota, Honda, Mitsubishi, Nissan, Daihatsu and Mazda. There are several factors that influence the success of the Japanese automotive industry. The main factor is the workforce which is having the specialist skills needed in the workplace and the innovation process in the Japanese firms. It can be concluded that the educational system is very important in order to produce employees who are highly skilled, creative, innovative and globally competitive. Toyota for example does not depending on the external technology, but the company create their own products through the research and development process. Therefore, Toyota became the top ranked of the most valuable cars brand in the world in 2011.

However, teaching and learning methods in Malaysia educational system led to emphasis on the mastery of the subject and answering techniques (Ainon and Abdullah, 2005). According to Akbariah (2009), creative and innovative thinking skills among the Malaysian students are less emphasized either by teachers, lecturers or parents where the focused are given to memorizing the book content. Generally, skilled workers are not only highly skilled in a particular specialty or field but also have the ability to think in the different perspective or creatively.

Besides that, a common problem faced in Malaysia is about the difficulty in obtaining the cooperation and involvement from industry in the development process of education. Mostly, the cooperation given by the industry is focused to the placement of the student for the practical training (Baba *et al.*, 2011). Furthermore, the training institutes are identified provide the basic knowledge and skills and the students are not exposed in detail. In fact, only local automotive industries tend to collaborate with the TVET institutions. Some industries just tend to collaborate with the institution in the research and development (R & D) process. They are more interested to train their own employees than to hire graduates. This factor is certainly hindering the opportunity for students to get the proper training in a real work environment.

Research Objective:

The aim of this study is to explore the trainers' perception regarding the knowledge and skills transfer among the trainees from Giat MARA Institutes by investigating the condition of teaching and learning process.

Literature Review:

The transformation of TVET has forced the need of reviewing the curriculum in order to meet not only the demands of the industrial market, but also the skills that absolutely the students should have. Curriculum development is an important component that should be taken seriously in providing the necessary training, knowledge, skills and values. For that reason, the development of automotive industry in Malaysia should correspond to the needs in terms of those skills.

The focus of TVET in the twenty-first century is crucial to meet the changing needs of human capital. New discoveries and technological advances will create new opportunities for vocations. Thus, the demands for multiple skills in the workforce are more recognised in industries than in community and education. This scenario occurred as industry needs shifted to the advanced technology required in order to remain competitive in a global market place. Thus, a quorum of stakeholders including the government, educational institutions, educators, communities and the industry, could collectively outline the future direction of TVET especially in the process of knowledge and skills transfer in the training programs.

In general, the issue of knowledge and skills transfer is no longer new. This issue has raised concerns relating to the applications of new skills, knowledge and attitudes within a new situation in the workplace. Writers such as Taylor *et. al.*, (2009) asserted that we need to be able to accept the changes and new concept in the training process in order to bridging the gap between the educational system and industry. Devos *et. al.*, (2007) through his research claimed that less than 20 percent of the skills and knowledge obtained in the training program are used in the workplace. Therefore, this provides an indicator to find effective ways to stimulate of a new learning in order to prepare of highly skilled manpower.

According to Faizal Amin and Ruhizan (2014), the main factors that affect the effectiveness of knowledge and skills transfer (learning transfers) are include work environment, trainee characteristics, training design and learning space. Based on Sitzmann and Ely (2011), work environment is important to understand the process of knowledge and skills transfer. The dimensions of the work environment are including opportunities and support to perform (Baldwin and Ford, 1988). Moreover, the trainee characteristic means that they are able to differentiate between wrong and right action in the workplace while the training design are refer to the training module, training content rules and the training materials. Apart from that, Holton *et. al.*, (2000) state that there are four factors that influence the training design which is content validity, personal capacity to transfer knowledge/skills, transfer design and opportunities to use the learning. And the last is

the learning space which is categorized into three sub-themes: digital resources, social learning space and mobile phone that help the trainees to find and share the information through the utilization of video and audio applications (Oblinger *et. al.*, 2006). This will enhance their social skills and allow them to find materials, new research and new innovation related to their field.

Clearly, training institutions play a vital role in the process of knowledge and skills transfer. Training institutions should typically attempt to replicate the workplace environment. In this context, adapting the entire process in the workplaces would provide a clear picture to the trainees of the latest best practice in the industry. Comprehensive exposure to the workplace environment in training institutions will enhance learners' experiences in real working environments.

Research Methodology:

A qualitative research approach was used in this study to develop insight to trainers' perspectives. Authors such as Creswell (2012) stated that human behavior and experience can be observed and illustrated clearly and precisely by the researcher due to the qualitative nature of the study. The purposive sampling technique was adapted and individual interviews were implemented for the data collection. It involved in-depth interviews by using video recording and sound recordings. The findings present the participant voice and view regarding the knowledge and skills transfers during the training process at the institutes.

Sampling of Participants:

This research was conducted in the state of Johor Malaysia. It takes place in six Giat MARA Institutes. Participants involved in this study are the trainers from Giat MARA Institutes. The researcher conducted six individual interviews and the process took approximately one hour. All the interviews were recorded and transcribed for analysis.

Result and Findings:

The aim of this section of the study was to investigate the trainers' views on the students' preparedness for the workplace in mechanical engineering (automotive). An important research finding was that the responses of the trainers tended to focus on the role that should be played by the trainers, industry and institutions as a center for human resource development in providing trained human capital in the automotive industry. According to the majority of the trainers, the training should exposes the trainees to a broad range aspect of technical skills, generic skills and the processes needed in the working environment to develop multi-skilled knowledge workers in the automotive industry. Specifically, the training must incorporate current work to align the trainees with the increasing

complexity of automobiles and the high level technology (Bureau of Labor Statistics, 2010). In contrast, writers such as Yusri Kamin *et. al* (2014) claimed that there are no such programs identified is fully available to replicates a wide aspect of those automotive industries. In fact, it can be said that the training programs cannot fit at all levels of expertise. However, Bowers (2006) stated that the training process at the institutes must certainly able to prepare the trainees to be adequately qualified for the market requirement.

From the point of teaching and learning process, respondents recommended that variety of learning methods need to be applied in order to enhance better understanding and competence in skills and knowledge among the trainees. Indeed, the learning process should provide opportunity to engage with the theory and adapt it into the working environment. Notably, there are several learning approaches that are proposed by the trainers such as problem-based learning and on-the-job training. Both of these methods have a strong connection to link between theory and practice related to the real-world environment. Apart from that, Giat MARA Institutes are more focused on a hand-on practical approach in the training system.

Authors such as Duch *et. al.*, (2001) stated that problem-based learning encourage students to have perspective understanding (to think outside the box) and to explore critically and analytically as well as using the appropriate learning resources. Furthermore, problem-based learning defined as a learning approach that involves students working cooperatively and encouraging individual accountability where students discover new information and seek the solutions to the real world problem (Noraini, 2006; Duch, Groh and Allen, 2001). Packer (1992) pointed out that that problem-based learning includes four elements such as concrete experience, reflective observation, abstract conceptualization and active experimentations. The finding affirm that problem-based learning are helping the trainees to acquire knowledge and mastery of skills such as communication skills, creative thinking, able to analyze and synthesize, have positive self-esteem and tolerance in which the trainees will be better prepared to meet the challenges in the workplace. One of the trainers claimed that *"problem-based learning helps their trainees to gain self-confidence by engaging with activities that generate problem solving, discussion and presentation"* (TRNR 1, pg.2, para 3, line 4-6). Another trainer viewed that *"problem-based learning provides the trainees with opportunities to apply the lessons learned during the class activities and workshop exercises and also encouraging them to exchange view"* (TRNR 4, pg. 5, para 3, line 4-6).

At the same time, the respondents also highlighted that on-the-job training is equally important of learning strategies instead of problem

based learning. The trainers have revealed that on-the-job training helps their trainees to apply what they have learnt in theory into practice in the context of the real life. The trainer also stated that *"on-the-job training stressed on the activities and strategies of teaching and learning that help the trainees to develop their potential and further meet the individual career planning and education"* (TRNR 3, pg. 4, para 2, line 2-5). Majority of the trainers suggest that the trainees should be given on-the-job training as a preparation to work in the automotive industry. However, there are same constraints and limitation of Giat MARA Institutes to effectively implement on-the-job training to the trainees. Most of the trainers claimed that the latest equipment is still deficient to assist the trainees with the technological changes in the workplace. The trainer said that *"the training exposes the trainees with the basic knowledge and skills like on how to repair the engine system, fuel system, air conditioning system, tires alignment, workshop management and etc. The trainees are expected to develop their technical proficiency in the workplace by learns from their own experiences."* (TRNR 1, pg. 1, para 4, line 7-9). They thought that the hard skills among the trainees can be expanded future even though they may be lack on it during their study. The trainers also informed that the new technologies such as hybrid technology, wiring and sensor, engine management and other technology are still in the process of development to the institutions.

Besides that, majority of the trainers also agreed that the facilities and the workshop equipment must be current and up-to-date. They focused on the things that need to be considered by the institutions. One of the trainer responded on this issue. *"I feel that the institution should provide a comfortable learning environment and meet the students' needs in terms of facilities, adequate equipment in the workshops and provide the trainers who are really skilled."* (TRNR 3, pg. 4, para 4, line 2-4). However in reality, the training material and documentation prepared for the learning process were regarded as not interactive and up-to-date. The problem is caused by the limited funding allocated to the institutions in order to set up the workshop equipment similar to the condition in the workplace. At the same time, some trainers are identified not up-to-date with the recent practice in the automotive industry. Within the limitation of their budget, broad spectrums of learning strategies is being taken into consideration at the training institutions. This includes partnership with industry, organize academic visits to the automotive factory and particularly send the trainers to the extensive courses to upgrade their knowledge and hard skills (i.e., on-the-job training and classroom practical). According to the respondents, this program will benefit not only to the trainers but also the trainees. They will be able to explore regarding the current

technology and have a clear picture the nature of the automotive working environment.

Another respondent viewed that the trainers' abilities in the process of knowledge transfer also affect the condition of teaching and learning at Giat MARA Institutes and become a key issue in the program's quality. Most of the trainers have a certificate to teach this course in which they have at least Malaysian Skills Certificate level 3. Nevertheless, majority of the respondent revealed that they only have work experience and practical training in the local automotive industry like Proton and Produa. Around 80 percent of the trainers are less experience in working or even cooperate with other international branded automotive industry such as Toyota, Honda, Ford, Audi or Daimler. Therefore, the trainers are not exposed to the foreign technologies. They also lack the opportunities to explore the latest advances of the new technology from the international automotive industry including the current practice, techniques and procedures. The finding supports the views of Wallenborn (2010: 4) in which he argued the lack of experience and knowledge among the trainers in their respective fields will indirectly create the problems in providing high quality of education and training programs. One of the trainers commented on this issue. He said that *"the trainers must be equipped with a strong theoretical knowledge and technical skills from a broad perspective including the local and international technologies"* (TRNR 5, pg. 9, para 4, line 2-5). Therefore, the trainers are encouraged to develop awareness of current practices in the automotive industry through further training. The other trainer stated that *"the trainers must have professionalism during the process of knowledge transfer in which they have to prepare their trainees as much practical experience and good fundamentals at the workplace"* (TRNR 6, pg. 10, para 3, line 2-4).

To overcome this problem, trainers are recommended to be retrained to align them with the appropriate and current practices in the automotive industry. They are required to undergo knowledge and hand on skills upgrading with the current technology such as Japanese technology or European technology. Then further they have to teach their trainees in respect of new things regarding the technological advances in the automotive industry. In simpler terms, the training should replicate the automotive environment and prepares the trainees to be well-informed and skilled workers. As known, technology is often changed and the trainers are demanding to be aware of what does industry need and what going on in the industry within a period at least for five years. This to prevent the situation where some employers argue that graduates from higher education program does not meet the industry need. For that reason, majority of the trainers suggested that the learning approach in the local institution should focuses on-the-job training,

innovation project, research laboratory, seminar, and the application of employability skills such as the ability to communicate, initiative and flexibility to meet the future challenges in the workplace.

When it comes to the current technology, it is closely related to the collaboration and partnership with the industry. The overall view of the trainers stated that the partnership with the industry is the best way to update current technology and practices in the automotive working environment. However, the trainers claimed that the cooperation in education mostly involve with the local automotive industry. The fundamental issue when the international automotive industry was not interested to invest their money, machinery or expertise to the local institution because they feel it does not bring profit to their company. Most of the industries usually like to take students for the practical training and offering them job if their performance is excellent. Intensive training was given among the trainees to develop their hard skills in the workplace. Stage by stage, they will upgrade their skills in the workplace from time to time. The trainers also informed that only local automotive industry assist and provide support in terms of advisory and relevant special tools. One of the trainers mentioned that *"the local industries including Proton and Produa which usually help the institute in the application of technology, knowledge and skills. These industries also have given donation and funding such as cars, machines or diagnostic tools for the learning session at the institute"* (TRNR 5, pg. 6, para 2, line 2-5).

Some trainer commented what they saw as an issue which is the difficulty to collaborate with the international automotive industry. In this case, one of the trainers expressed that this issue indirectly eliminates their opportunities to train their trainees internationally and bring up them with the new knowledge and skills for the training program in institute. This also affects the trainees' ability to compete and to adapt the conditions in the workplace. One of the trainers responded regarding to the quality of the trainees through his personal observation. He claimed that *"the trainees have the basic knowledge regarding this field such as on how to service the carburetor system, diesel fuel system, vehicle electrical system and then on how to repair the clutch system and so on. But most of the trainees have not yet reached the stage of being researcher in this field when majority of them just completing their work based on what they have learned before"* (TRNR 6, pg. 8, para 5, line 2-5). As has been said, comprehensive exposure to the workplace environment is very important to enhance learners' experiences in real working environments without letting their skills and knowledge in isolation.

In the past, the trainers mentioned that they have organized a visit to the automotive factory to sensitize the trainees with the latest technological advances regarding this field. The purpose of the

visits is to expose the trainees with the valuable experiences at the workplace. The new technology in term of latest equipment such as machinery and other relevant special tools are still deficient at the institutions. The trainer stated that *“during the visit, trainees are exposed on the process of drafting a vehicle component, understand in detail about the automation process, gain new experience about the actual work situation and able to see more clearly the process of manufacturing the components and the installation of engine parts”* (TRNR 6, pg. 10, para 5, line 2-5).

Besides that, the trainers said that computer simulations are also used during the training process at the institutes to improve the trainees' understanding of the current technology in the automotive industry. Some trainers stated that *“information technology is used to develop technology skills. i.e., using internet to find materials, new research, new innovations and technology related to the automotive industry”* (TRNR 5, pg. 9, para 5, line 2-5). This strategy indirectly helps in providing the trainees with the information on the technological changes.

Another factor considered by the trainers is about the content of the syllabus. The trainers informed that the training provides assessment, project and assignment. Individual modules are designed to develop trainees' ability to collect, analyze and organize information. They claimed that group work, problem solving, innovation project and report writing are required to enhance learning skills. One of the trainers mentioned that written and practical assignments are based on the problem solving skills taught during the workshop classes. At the same time, entrepreneurship is highlighted as a direction for the trainees who want to manage automotive business after finish their study. The training exposes the trainees to a customer-centered approach. According to the trainers, workshop at the institutes is open for public to send their cars to be repaired by the trainees with the reasonable rate. Besides that, scheme for entrepreneurship also provide by the institutes including the financial support and equipment for the trainees who are interested to open a workshop in the future. The overall view of the trainers agreed that the curriculum is suitable and the training module help develops hand on skills needed in the workplace. However, most of the trainers noticed that it still far behind from industry practice because the training modules have emphasized on the basic skills and knowledge. Furthermore, the trainees took only two semesters to completing their study in this course to get a certificate which result a lot of knowledge and skills cannot be transferred to the trainees.

Even so, there are requirements for the syllabus to emphasize of learning modern technology which the training must incorporate recent work to engage the trainees with the latest best practice in the

automotive industry. According to the trainers, most of the trainees at the institute desire to learn advance technology linked to the information received from the trainers and their observation during the visit to the automotive factory. The trainers indicated that lack exposure to the current technology in the training process affect the motivation of the trainees because they believe that employers are always looking at people who have good technical skills. There are concern in the future that the trainees may arise difficulties to face the different situations between the training institute and the workplace.

On the other hand, the trainers stated that most of the trainees are looking interested when they are exposed to the new topics such as wiring and sensor, direct injection technology, engine management, cam bass and others. This provides an indicator to the institutions as well as the curriculum developer to ensure that the developments of curricula regarding this course are relevant in term of trainees, substantive outcomes and toward technological development in the automotive industry. This are supported by Finch and Crunkilton (1999) and Mouzakitis (2010) in which they asserted that the curriculum design must be include a variety of learning activities and experience based on market recognition and needs analysis.

Conclusion:

This article has focused on the trainers' perspective regarding the knowledge and skills transfer on the students' preparedness for the workplace in mechanical engineering (automotive). The study attempted to see the condition of the training process at the institutes in order to remain competitive in producing talented, highly-skilled and innovative workforce that meet the needs of employers in the automotive industry. Despite some difficulties that occurred on this study, the findings have shown that the important key elements that should be emphasized in the training process according to trainers perspective are including using a variety of learning methods (i.e., problem based learning and on-the-job training), expanding partnerships and collaboration with the local and international automotive industry, retraining the trainers to align them with the appropriate and current practices in the workplace and providing good facilities and equipment, teaching aids, material and adequate space at the institutes. Notably, the development of curriculum design must be considering the need of employers, individuals and also skills changes in the automotive working environment.

Based on the outcomes of the study, there are suggestions for future research that could see a comprehensive and inclusive involvement from all stakeholders perspective to ensure that the future training program is adequate and appropriate to the automotive working environment and encompass the

technological changes in industry. Specifically, consultation among the stakeholders including the institutions, educators, government and industry will develop new paradigm for preparing the quality of human capital. This finding supports the views of Yusri Kamin *et. al*, (2013) that “the best practices of the training providers could be improved by directly involving stakeholders in their curriculum design activities. This may include implementing customized programs that support local economic, social and environmental priorities”. Importantly, it is a reasonable to make some reinvestment in providing more access and opportunities to quality education and training.

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