Application of thinking skills in career: A Survey on Technical and Vocational Education Training (TVET) qualification semi-professional job duties

Mohd Yusop Ab.Hadi*, Razali Hassanb, Abdul Rashid Abdul Razzaqc, Mohamad Zaid Mustafad

*Mohd Yusop Ab.Hadi (PhD, Associate Professor), Universiti Tun Hussein Onn Malaysia, 86400 Parit Raja Batu Pahat, Johor, Malaysia
bRazali bin Hassan (PhD, Associate Professor), Universiti Tun Hussein Onn Malaysia, 86400 Parit Raja, Batu Pahat, Johor, Malaysia
cAbdul Rashid bin Abdul Razzaq (PhD), Universiti Tun Hussein Onn Malaysia, 86400 Parit Raja Batu Pahat Johor, Malaysia
dMohamad Zaid bin Mustafa Universiti Tun Hussein Onn Malaysia, 86400 Parit Raja Batu Pahat, Johor, Malaysia

Abstract

Technical and Vocational Education Training (TVET) plays role to produce workers with reflexes that allow them to interact with job duties in the organization of workplace. Consequently, workplace organization lead proponent of TVET program as result to provide readiness semi-professional workers. A survey on semi-professional job duties has made to find out utilization of thinking skills competencies in work process. There are at least six thinking skills initiate by worker in work process to accomplish job task in semi-professional job duties of TVET qualification; care observation, judging, inquiring, imagining, remembering, wondering and evaluating.

Keywords: Technical and Vocational Education Training (TVET); Semi-professional job duty; Thinking

* Corresponding author. Tel.: +60137516451
E-mail address: yusop@uthm.edu.my, yusop02@yahoo.com

1877-0428 © 2015 The Authors. Published by Elsevier Ltd. This is an open access article under the CC BY-NC-ND license (http://creativecommons.org/licenses/by-nc-nd/4.0/).
Peer-review under responsibility of the Organizing Committee of the 2nd GCBSS-2015
Keywords: Technical and Vocational Education Training (TVET); Semi-professional job duty; Thinking
1. Introduction

Technical and Vocational Training is established for the purpose of geared up workforce to accomplish job duty. Job duties were array by job organization to consolidate the finding of a number of organization target, which contend, are incomplete. For example, one of the arrays of these job duties is the job task to realize situated within Tenaga National Berhad (National Energy Limited) company. The target of this company established is to serve electrical energy for Malaysia nationwide (Tenaga Nasional Berhad, 2015).

As long as job organization has a target to be complete, the organizations are required professional, semi-professional and k-worker to accomplish the duty of organization target to achieve. Almost professional workforce is produce by professional body and semi-professional and k- worker are produce by TVET. At this moment TVET function are helpful to fulfill employer needs. Kuala Lumpur Industrial Training (2015) stated that generally program offer in TVET are for the purpose to produce competence and skillful semi-professional workforce.

A series of training courses and programs in TVET institution has organized to strengthen the work skills of workforce in work place. The programs were aim at enabling students to obtain semi-professional knowledge and grasp current issues. For example, students of a TVET in Malaysia here had to move out of the learning institution with enough skills and knowledge on sudden notice as the Tenaga Nasional Berhad had wanted them to yield electricity power for nationwide usage. (Tenaga Nasional Berhad, 2015). TVET are also to endeavor equipped trainee with innovative attitude, creative and highly etiquette while to accomplish responsibility in work (ILP, 2015).

To bring into existence the workers that are almost able to fulfill work organization requirement, TVET institution should be identified the knowledge and skills given to the students (Ahmad, 2002). Nonaka and Takeuchi (1995) were divided knowledge into explicit knowledge and tacit knowledge. In a simple explanation, explicit knowledge is the knowledge that could be describe by using words. The tacit knowledge is similar to personnel image and kept in mind. Thinking skills and problem skills are include in tacit knowledge. Delahaye and Brian (2000) differentiate between explicit knowledge and tacit knowledge as ‘explicit knowledge can be expressed in words while tacit knowledge is highly personalized, is held within the subconscious mind and is hard to formalize’

2. Problem Background

Employers of work organization were optimistic that TVET institution would be able to mould their students to be skillful and knowledgeable of work they had always dream. As an example, virtually all of the prerequisite to apply for technician job vacancy at workplace were based on certain of explicit knowledge and tacit knowledge, dealing with the level of academic qualification in Table 1. (Center of Career Information, Ministry of Human Resource, 2015) and (Jobstore, 2015)

<table>
<thead>
<tr>
<th>Position</th>
<th>Academic level</th>
<th>Duty</th>
</tr>
</thead>
<tbody>
<tr>
<td>Technician-Compressor Technique Service (CIS)</td>
<td>Knowledge</td>
<td>On Site:— On arrival at customer’s premise inform person-in-charge before any jobs are being carried out, to avoid interruptions in production or any other business interruptions. Implement correct working methods, use correct tools and observe all safety rules and regulations. Collection of local purchase parts from suppliers for service jobs Carry out daily jobs as assigned / instructed by the Supervisor / Manager Follow all instructions given in the scope of works as per service work order Test run and monitor serviced units, record all</td>
</tr>
<tr>
<td>Educational requirements</td>
<td>Certificate / Diploma in mechanical / Electric-Mechanical discipline</td>
<td></td>
</tr>
</tbody>
</table>

Table 1. Entry requirement and duty of technician job
Personality requirements

Able to work as a team and customer-oriented
Self-motivated and able to work independently in a challenging and demanding environment
Able to write and communicate verbally in English
Analytical and detail oriented

Electrical Engineering Technicians

Diploma in Electrical Engineering/ equivalent or Malaysia Skills Certificate (Electrical Engineering or else Diploma in Electrical Engineering Technology /equivalent

Electrical engineering technicians perform technical tasks under the direction and supervision of electrical engineers, contributory to the design, construction, installation, maintenance and repair of electrical systems and equipment.

Tasks include:
- Assisting in research and development works concerning electrical systems, equipment and facilities and testing prototypes;
- Assisting in design and layout of electrical installations and circuitry;
- Preparing detailed estimates of quantities and costs of materials and labour required for manufacture and installation;
- Assisting with technical supervision of the manufacture, installation, utilization, maintenance and repair of electrical systems and equipment;
- Applying technical knowledge of electrical engineering theory and practice to identify and solve problems arising in the course of their work;
- Performing related tasks;
- Supervising, scheduling and monitoring task of other workers.
Civil engineering technicians perform technical tasks in civil engineering research, design, construction, operation, maintenance and repair of buildings and other structures, such as water supply and wastewater treatment systems, bridges, roads, dams and airports.

**Tasks include:**
- performing or assisting with field and laboratory tests of soils and construction materials;
- providing technical assistance connected with the construction of buildings and other structures, and with surveys or the preparation of survey reports;
- ensuring compliance with design specifications, relevant legislation and regulations, and maintenance of desired standards of materials and work;
- applying technical knowledge of building and civil engineering principles and practices in order to identify and solve problems arising.

From job duties in Table 1 shows that employers always genuinely look for technician that are able to meet the job duties specification. These expectations are easily achievable supposing that the workers fulfill the academic level of explicit knowledge and tacit knowledge. There are many factors influencing achievable job duties, however the major factor contribute in job output is workforce competence. Competence is the workforce strength to accomplish job duties. A cluster of related competence are abilities, commitments, knowledge, and skills that enable task force act effectively in a job.

Competence indicates sufficiency of knowledge and skills that enable someone to act in a wide variety of situations. Because each level of responsibility has its own requirements, competence can occur in any period of a person's life or at any stage of his or her career (http://www.businessdictionary.com/definition/competence.html#ixzz3djoUhSqx).

Initial job competency usually built in worker since they are students in TVET institution and then gradually expend continuously to perform competent workers. Competencies develop in workers through work experiences and attending human resources, development training in service organize by work organization.

Ministry of Urban Wellbeing, Housing and Local Government (2015) in Level 1 Assistance Engineer Competencies Course Syllabus, divided job competencies into two components; Generic competency and functional competency. Generic competencies are worker competence to manage and admin the organization. These generic competences need workers to possess knowledge and skills use in job duties to meet organization mission, and organization vision. Generic competences also use for job to secure the organization, and financial organization management.

Furthermore, functional competence need workers competence in vocational job and has knowledge and skills in engineering field, which are electrical, mechanical and civil. Both generic components and functional component are playing the role to meet job duties. As example generic competence needs for electrical technician have knowledge due to job duties, which are about recent act, and regulation of electrical supply, recent on act and regulation of electrical wiring, first aid, electrical load calculation, and electrical engineering job specification. Furthermore to meet functional competence electrical technician should has knowledge and skills such as about schematic electrical drawing, electrical accessory, main switch panel, current calculating and electrical load, power factor, electrical generator, lightning protection, and earth system.

In the process to meets job duties, both generic competences should utilize wisely. Among the knowledge and
skills in generic competence is thinking skills. According to Mohd Yusop (2010), quality and quantity of job outcome is influence by many skills factors, which are in job competence itself, there are include thinking skills. Job competence is useful due to accomplish daily routine work; on the other hand thinking skills is more helpful due to accomplish non-routine work. Generic competency consumption will see some fierceness impact due to the job duties inflationary pressures with the implementation thinking skills.

The non-routine work in which not presented in provisional array on routine duties gave workers with TVET qualification added impetus to complete duties also in the timeframe possible. Thus having some type of thinking skills benefit workers to assure the work progress of whole organization duties going on in timeframe although unexpected trouble interrupted but solve effectively. It would be helpful to know thinking skills, how effective thinking skills will thrive in work. This helps TVET institution to decide the curriculum that best fits their students.

3. Research objective

The objectives of the research are to acquire the answer of questions below,

i. What are the electrical engineering technician job duties that consider applying thinking skills?

ii. What are thinking skills activities executed by electrical engineering technician in work process?

iii. Is it electrical engineering technician have formally learned about thinking skills before holding electrical engineering technician post?

4. Research methodology

Overall, of the research method applied in this research is inclined towards historical methodology. Historical methodology is the process by which historians gather evidence and formulate ideas about the past. It is a framework through which account of the past is constructed. (Sullivan, 2015). The data and information due to research objectives collected through oral tradition. Oral tradition consists of stories that are not written down but passed on verbally, usually from an eyewitness to succeeding generations.

5. Research finding

5.1 What are the electrical engineering technician job duties that consider applying thinking skills?

Research finding shows that there are some thinking activities in work for TVET qualification to apply thinking skills. Thinking activities is almost provision in work that use thinking skills to solve problem. Thinking activity is a mental activity intention and the ensuing job outcome from electrical engineering technician. According to Ruggiero (2008) `a purposeful mental activity over which we have some power or control'. Any mental activity that helps formulate or solve a problem, make a decision or fulfil a desire to understand’. Furthermore Woods (1975) explain problem solving as the process of obtaining a satisfactory solution to a novel problem, or at least a problem which the problem solver has not seen before.’

Explanation of problem solving derived from Fensel and Motta, (1997) as ‘This simply means that problem solving is a series of techniques, both cognitive and behavioral, that can be applied in various fields or areas to generate solutions. Problem solving and the techniques associated with it are domain-independent reasoning components, which specify patterns of behavior that can be reused across applications. Narrative information about using thinking skills in working from electrical engineering technician as below:

In middle of doing daily routine job, which is servicing electrical motor, suddenly a production operator gave notice that shows her production machine is out of order. She cannot proceed her work as long as the machine is not obtain proper repaired. Servicing record indicated that this machine deserves procedural maintained process. Organizations will lack of production target as long as the machine is out of order. The more time taken to repair the machine the more organization obtain suffering loss. This job situation is in TVET qualification job, which not a routine job that
to handle by electrical engineering technician. To fulfill the task requirement, which it is to overcome the problem, electrical engineering has supposed to use thinking skills to identify problem and possible solution to restore production machine function. Thinking skills which is obviously applied in duties of restoring the production machine shows in Table 2

<table>
<thead>
<tr>
<th>Thinking skills</th>
<th>Thinking skills activities</th>
<th>Job duties</th>
</tr>
</thead>
<tbody>
<tr>
<td>i. Careful observation</td>
<td>Self are imagining the problematic machine image, imagining the ability in work to overcome problematic machine and the degree of self-confident. Imagining the appropriate solution of problem solving work process.</td>
<td>Initial duty: to evolve self-confident to have achieved considerable success in production machine problem solving.</td>
</tr>
<tr>
<td>ii. Judging</td>
<td>Move closely to the problematic machine. Careful observation to identify caused of machine function failure and avoidance casualty while working.</td>
<td>Thinking due to perform conducive and safe work situation.</td>
</tr>
<tr>
<td>iii. Inquiring</td>
<td>Move closely to the problematic machine. Carefully observation to identify caused of machine function failure and avoidance casualty while working. Self-inquiry to identify sort resource of information caused of electrical power failure to activate machine function and selected working method is relevant for example is himself, expertise, book, and machine supplier</td>
<td>Thinking due to collecting sort resource that are able to validate selected working method to restore machine function is relevant</td>
</tr>
<tr>
<td>iv. Imagining</td>
<td>Move closely to the problematic machine. Careful observation to identify caused of machine function failure and avoidance casualty while working.</td>
<td>Thinking through self-remembering to identify caused of electrical power failure to activate machine function</td>
</tr>
<tr>
<td>v. Remembering</td>
<td>Move closely to the problematic machine. Careful observation to identify caused of machine function failure and avoidance casualty while working. Self-remembering to identify caused of electrical power failure to activate machine function</td>
<td>Thinking due to produce conducive workplace and safe situation.</td>
</tr>
<tr>
<td>vi. Wondering</td>
<td>Wondering of possible dangerous emerges while repairing the problematic machine. Wondering of decision taken is inappropriate solution.</td>
<td></td>
</tr>
<tr>
<td>vii. Evaluating</td>
<td></td>
<td></td>
</tr>
<tr>
<td>viii. Interpreting</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

5.2 What are thinking skills activities executed by electrical engineering technician in work process?

By referring the answer of research question 1, the appropriate situation of electrical engineering technician job duties that consider applying thinking skills is similar with thinking skills activities executed by electrical engineering technician in work process shows in Table 3.
Wondering of job outcome reflected negative impact on his job reputation

Judging

Judging to decide on the effective method from number of propose repairing machine method.

To decide the best method is use in repairing machine.

Evaluating

Thinking in every step of repairing machine due to assess the level of success achieving job target.

Method and work process will be asses due to ensure job target is achieved

Interpreting

Interpretation of thinking outcome is transform into the action.

Working to repair the problematic machine.

5.3 Is it electrical engineering technician have formally learned about thinking skills before holding electrical engineering technician post?

The technician told that he has not learn about thinking skills formally as a specific subject while study in TVET institution even before holding electrical engineering technician post. Instead, probably TVET students experience in applying some skills by the lecturer infuse it while teaching a certain TVET subject.

6.0 Conclusion and suggestion

The research finding shows that technician duties require of thinking skills in work especially to triumph over non-routine job duty. Usually such non-routine job almost related with problem solving matter, and unexpected problems but needs to immediate resolve. This work are pretend to avoid widely organization operation interrupted.

As conclude there is a veritable applies of thinking skills await in job duties of TVET qualification. Almost thinking skills acquired in work progress in form of mental activity such as careful observation, judging, inquiring, imagining, remembering, wondering, evaluating and interpreting.

Therefore, students, which are forthcoming workforce with TVET qualification, supposed to be equipped with thinking skills in teaching and learning process at TVET institution. Thinking skills should teach to the students through an extraordinary course. Curriculum syllabus is concern on thinking skills to get right solution to solve the problem; such as careful observation, judging, inquiring, imagining, remembering, wondering, evaluating and interpreting.

The distinction of TVET extends beyond equipping the students with academic knowledge and thinking skills. This is in line with the ethos of challenging students to step out of structured rote learning and develop their thought processes. Strong partnerships between the TVET institution and job agency like government agency, industry agency and company agency ensure highly relevant thinking skills course curriculum closely aligned to job duties. This make TVET graduates highly sought after.

References


