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Further training in occupational skills for vocational teachers: the case of metal cutting in Malaysia

Abstract

The current pre-service training undertaken by Technical and Vocational Education and Training (TVET) teachers in higher learning institutions cannot be expected to provide adequate occupational skills. Thus further additional training is necessary to raise the vocational competence of TVET teachers. The purpose of this article is to discuss the current provisions for further training under the Malaysian Ministry of Education's (MoE) TVET system. The discussion presented in this article is one of the outputs of a Regional Cooperation Platform (RCP) project that evaluates the curriculum for further training in occupational skills for vocational teachers with a particular focus on the field of metal cutting. Document analysis, focus group discussions and interviews were conducted to gather data for this project. Unpublished and published government reports were analyzed and a group of 16 teachers from vocational colleges, which are under the MoE, participated in the focus group discussions and interviews. The data analysis results show that further training is in fact provided to TVET teachers as part of their in-service training. However this training is often customized to existing needs and may change from time to time. Thus, the hours of training received may differ from one teacher to another. Limited opportunities for further training is also an issue that needs to be resolved. When provided, the further training curiculum is usually designed specifically based on the metal cutting module as offered by the vocational colleges under the MoE. In addition to job competence skills, instructional skills training are also incorporated in the training programs to enhance their instructional competence in metal cutting. In conclusion, although there is no standard curriculum for further training in the metal cutting occupation for TVET teachers, continuous efforts through in-service training are made to support TVET teachers' development of their occupational skills.

1 Introduction

The term 'further training' refers to training that is provided to TVET teachers upon successful completion of their specified teacher training program. Further training on occupational skills in particular are necessary in order to increase competence of every TVET teacher, and ensure that teachers are transferring updated knowledge, technology, and current occupational skills to students. For that reason, a standard curriculum and development for further training in a particular area should have a clear definition and a comprehensive mechanism for achieving this goal, especially for industrial partnerships. Because input from industry is deemed important in designing curriculum development for further training, the mechanism

of further training for TVET teachers should be well-structured from the grassroots. However, there are no standards for further training on occupational skills at present, which has resulted in diverse forms and modes of further training for TVET teachers (SkillsMalaysia 2013).

Typically, practicing TVET teachers under the Ministry of Education system in Malaysia are either diploma holders who graduate from TVET institutions such as polytechnics and community colleges, or degree holders who graduate from universities. In general, teachers who graduate from polytechnics and community colleges are relatively better equipped in terms of hands-on competencies compared to university graduates. This is due to higher opportunities for hands-on training which are provided within the respective TVET institutions as part of their diploma programs, and which give greater emphasis on skills training (Department of Higher Education 2013). However, irrespective of their qualifications, most of the newly-qualified TVET teachers are still in need of further training in occupational skills, notably in the field of metal cutting, in order to better serve their respective students.

To enhance the skills of secondary school leavers, guidelines were set by the Ministry of Education that all TVET teachers must possess a minimum of Malaysian Skills Certificate Level 3 (Supervisory Level) i.e. one level higher than the expected skill of secondary school leavers who are supposed to achieve the Malaysian Skills Certificate Level 2 (Operation and Production Level) upon graduation. Thus, to meet this requirement, some universities are realigning their teacher preparation programs. One such university is the *Universiti Tun Hussein Onn Malaysia* that has incorporated skills training into its degree programs via its Faculty of Technical and Vocational Education starting from 2012. For example, the students from its Bachelor in Vocational Education (in electrical electronic) will be awarded Level 3 of the Malaysian Skills Certificate in addition to the degree conferred. The skills training component of the curriculum is designed with industry input while taking into account existing training needs of pre-service teachers. Thus, the integrated program as a whole has been designed to meet the degree and occupational skills requirement without lengthening the overall study duration of TVET teachers. However, the integrated program could only cater to limited occupational skills requirements and thus further training for TVET teachers is still a necessity for many occupational skills areas.

As mentioned before, there is yet to be a common standard for further occupational skills training of TVET teachers in the country. The absence of a standard curriculum for further occupational skills training at the national level in an area as specific as metal cutting has resulted in the adoption of diverse methods and approaches to further training of TVET teachers. Therefore, the purpose of this paper is to describe the current provision of further training in occupational skills for vocational teachers for metal cutting under the MoE TVET system.

1.1 Malaysian TVET Structure

Several ministries such as the Ministry of Rural and Regional Development, Ministry of Human Resources and the Ministry of Youth and Sports provide for TVET opportunities in Malaysia (Alias & Hasan 2013). However, the focus of this paper is on TVET programs provided under the Ministry of Education where TVET forms part of the general education system.

General education is provided at both primary and secondary level. Primary education is compulsory to all children from the age of six, followed by five years of secondary education. Secondary school leavers with the Malaysian Examination Certificate or *Sijil Pelajaran Malaysia* (SPM) qualifications can then opt to continue their education in Form Six (post-secondary level provided in schools), Matriculation College programs or in pre-university programs to obtain pre-university qualifications. At the post-secondary level, school leavers have the opportunities to pursue their studies at the certificate or diploma level. The diploma level is for secondary school certificate holders (SPM) from the age of 17 onwards whereas the bachelor degree level is for those with post-secondary qualifications such as the Malaysian Higher School Certificate or *Sijil Tinggi Persekolahan Malaysia* (STPM), matriculation certificate, General Certificate of Education (GEC) 'A' level or other equivalent pre-university qualifications.

For those who are keen to pursue their studies in technical and vocational education (TVE) after SPM, they can enroll in certificate or diploma programs that are offered by polytechnics and community colleges. Undergraduate and postgraduate programs up to doctoral level are offered by universities and university colleges. Each level may be further subdivided according to the nature or purpose of the qualifications.

TVET under the MOE however, begins much earlier i.e. at the lower secondary school level with the introduction of Basics in vocational education courses in mainstream programs (Ministry of Education 2012). These courses are offered to provide choices to students who are more inclined to practical and hands-on learning which lead to the Malaysian Skills Certificate Level 2. At the upper secondary level, more choices are open to students with three TVET streams offered under the MOE namely the technical stream, the vocational stream, and the skills training stream. The vocational streams are offered in vocational colleges in order to meet the following objectives:

- To provide pre-employment skills as well as general education,
- To provide diversified technical courses tailored to the country needs,
- To consolidate career guidance in technical and vocational field and,
- To establish smart partnership with industries.

There are currently 78 vocational colleges operating in Malaysia that offer vocational courses in electrical and electronic engineering technology, mechanical and manufacturing engineering technology, civil engineering technology, transportation, hospitality, business, informa-

tion and communication technology and agriculture (Technical and Vocational Education Division 2013).

At the post-secondary level, there are 30 Polytechnics and 68 Community Colleges, administered directly by the Department of Polytechnic Education and Department of Community College Education of the Ministry of Higher Education (Economic Planning Unit 2006; Department of Higher Education 2013). The programs offered at these institutions lead to the award of a certificate, diploma and an advanced diploma qualification.

Meanwhile, at tertiary level, there are six technical universities (these used to be known as university colleges) that have been established by the government to cater for the increasing demand for technical education at a higher/tertiary level. Aside from the community colleges, polytechnics and universities, some government ministries also carry out training activities at the technician/sub-professional and craft levels for school leavers, such as the Ministry of Human Resources, the Ministry of Youth and Sports, Majlis Amanah Rakyat (MARA) under the Ministry of Rural and Regional Development, and other government agencies.

With regards to private education institutions, TVET at the tertiary level is provided by the University of Kuala Lumpur, Kuala Lumpur Infrastructure University College, University of Technology Petronas, University of Tenaga Nasional, and many other established private higher educational institutions leading to the award of a diploma or a degree.

As a result of the current educational system for TVET teacher training, TVET teachers hold either a bachelor's degree or diploma qualifications. A bachelor degree is a four year program including teaching practice while a diploma program is a three year program. TVET teachers obtain training from technical universities or teacher training institutes. The government is currently in the process of enforcing the requirement that all secondary school teachers must be degree holders. Therefore, some TVET teachers who are diploma holders are currently in the process of obtaining their degrees from public universities.

2 Methodology

As previously mentioned, this paper is one of the outputs from a Regional Cooperation Platform (RCP) project. The goal of the RCP project is to evaluate the curriculum for further training in occupational skills for vocational teachers in the field of metal cutting in TVET institutions under the Ministry of Education. Data were triangulated from document analysis, focus group discussions and interviews. Triangulation was used to achieve a higher validity of findings through the combination of multiple data sources (Kimchi et al. 1991).

2.1 Document analysis

The purpose of document analysis was to gather relevant information on the current status of metal cutting courses within the TVET schools program in Malaysia. The main contexts of document analysis included the teacher training program, training curriculum, skill standards,

training providers, and teacher engagement on metal cutting. Unpublished and published documents were gathered and analyzed from multiple sources; articles from online and printed journals, technical reports from government and documents from official government web sites. The documents were analyzed according to clustering of similar meanings using coding techniques to build up a set of definite themes of the study.

2.2 Focus group discussions

Focus group discussions were conducted to discover TVET teachers' perceptions and opinions toward training for metal cutting competence. The focus group discussions data are expected to increase the credibility and validity of the document analysis results (Edmunds 1999). Sixteen teachers from vocational colleges under MoE participated in the focus group discussions and interviews. The participants in general, have more than five years' experience teaching welding technology or 'metal cutting' courses in vocational colleges, previously known as vocational schools. The participants volunteered to share their knowledge and experiences on metal cutting training which helped researchers to have a better understanding on skills training implementation in Malaysia. The qualitative data gathered from the focus group were analyzed and synthesized accordingly.

2.3 Follow-up interviews

In addition to document analysis and focus group discussions, follow-up interviews were also conducted to support the findings from the previous methods. Two participants from the focus group were selected to further discuss the metal cutting training provided for TVET teachers under the MOE.

Both of the two interview participants agreed that metal cutting training should be regularly implemented by the training providers. They also suggest that the training providers should update their training curriculum to be in line with the latest technological know-how on metal cutting such as water-submerge cutting.

3 Discussion and Findings

3.1 Provisions for a metal cutting curriculum

There is no specific program for metal cutting that is offered by any TVET institutions under the Ministry of Education. Nonetheless, metal cutting teaching and learning materials are embedded within another program such as the Welding Technology Program that is offered by vocational colleges under the MOE. Specifically these materials are embedded within the Introduction of Welding Technology module that includes metal cutting materials under the following units:

- Cut metal using disc cutter
- Cut metal using power saw

- Cut metal using band saw
- Cut metal using circular saw
- Cut metal using hydraulic squaring machine
- Cut metal using hand lever shear

(Ministry of Education 2012)

Metal cutting is offered as part of a larger program to enable students to be competent workers in the industry, and providing workers for industry is part of Malaysia's efforts to raise Malaysia to developed country status by 2020.

In the context of curriculum design and development, there is no specific philosophy or references for metal cutting curriculum and training. However, all TVET related training falls under the umbrella of the National Education Philosophy, including the metal cutting curriculum which is designed to comply with this.

3.2 Further training for TVET teachers

In practice, professional development provided for vocational teachers is organized and coordinated by the Division of TVET Coaching Development, Technical and Vocational Education (TVE) Division, MOE. The main focus of the in-service TVET program is to strengthen the vocational skills of TVET teachers through programs that are strategically designed to meet the needs of the country. The training programs are designed to take into account the needs for personal mastery, development of mental models, shared vision, team learning, and system thinking. To streamline the functions and activities of in-service curriculum development, the aims and objectives of the program are set by the Division of TVET Coaching Development, under the TVE Division of the MOE as follows:

- To improve teachers' teaching performances
- To improve teaching and learning management performances
- To improve relationships with industry
- To improve image, identity, and work ethics of vocational college teachers
- To improve teachers' knowledge and skills

The aims and objectives indicate that the primary purpose of in-service training for vocational teachers is to emphasize teachers' engagement in teaching. It is also to help and encourage vocational teachers to develop new teaching interventions in their instructional practices as teachers.

In general, in-service training emerges when there are requirements and needs from concerned parties which involve the implementation of the existing program offered by vocational colleges in Malaysia. It can be a one-off or a continuous program depending on the situation. The in-service training curriculum development is illustrated in Figure 1.

The TVET Training Development Division under the Ministry of Education is responsible for organizing, coordinating, and monitoring any training programs under the vocational

colleges. The budget allocations for the training programs are provided by the Ministry based upon the training programs planned by the TVET training development division for the specific year.

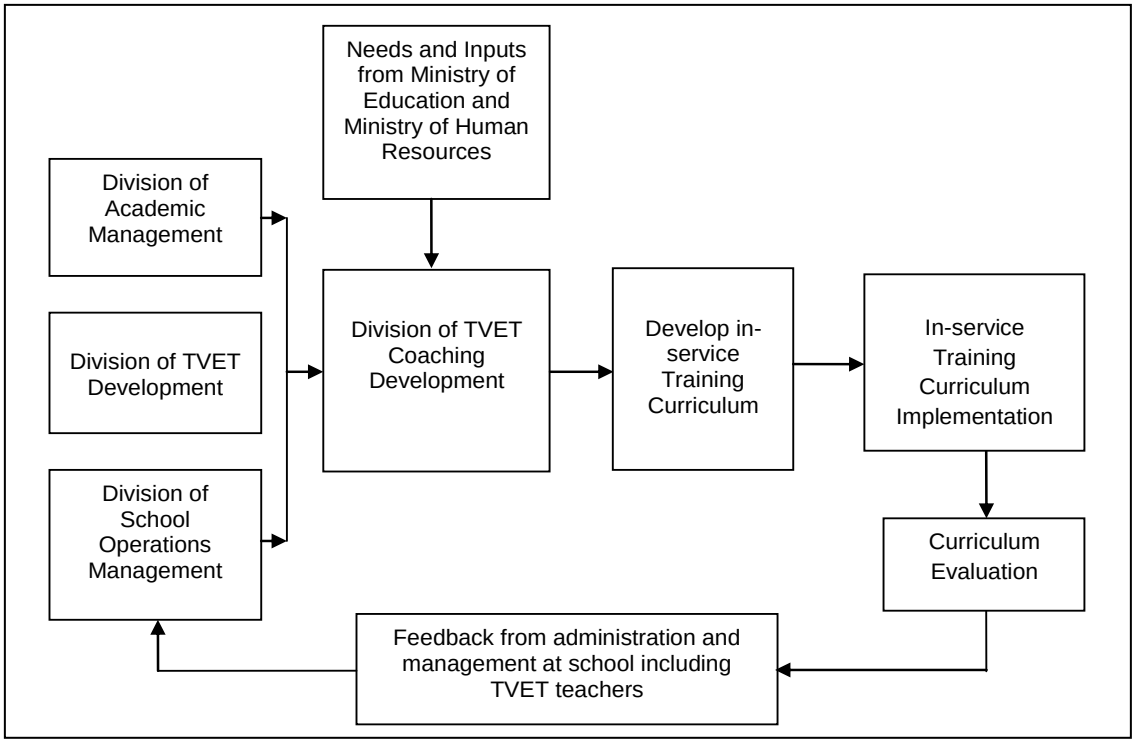

Figure 1: Curriculum Development for in-service training under the Ministry of Education, Malaysia

3.3 Development of the in-service training curriculum

The training curriculum is usually custom-made for the specific needs of TVET teachers at any particular time. Thus, in addition to the in-house input from the training division staff, the division also receives relevant and valuable input from top management of the MOE as well as from other divisions and individuals under the Ministry who are associated with either the planning or the implementation of the in-service training programs.

They include:

- The Academic Management Division
- The TVET Staff Development Division
- The School Operations Management Division
- Schools
- TVET teachers from schools under the Ministry of Education

The MOE, in its efforts to provide up to date and industry relevant training programs, works closely with the Ministry of Human Resources. The Ministry of Human Resource has its own TVET training curricula which are overseen by the Skills Development Department under the

Ministry. Successful participants who have undergone the training programs under the Ministry of Human Resources are awarded the Malaysian Skills Certificate (*Sijil Kemahiran Malaysia* [*SKM*]) which ranges from Level 1 (lowest) to Level 5 (highest). All TVET training providers under the Ministry of Human Resources must be accredited by the Ministry so that they comply with the National Occupational Skills Standards (NOSS) requirements, which have been developed by National Vocational Training Council (NVTC), which is part of the Ministry of Human Resources. NOSS is a standard document that specifies the expected competency level to be achieved by a skilled worker according to his/her specific occupation. By integrating the NOSS requirements in the in-service teacher training programs, teachers are not only competent for school-teaching but are also industry-recognized for their skills.

Apart from the formal in-service training programs that TVET teachers can attend to improve their skills, the achievement in-service training programs' objectives are also supported via other forms of professional development programs such as competency-based education and training offered by other agencies, coaching and mentoring by peers, traineeship programs, teacher networks, collegial interactions with expert colleagues, attending seminars, participation in school enterprise projects and participation in industrial attachment programs.

3.4 In-service training programs in metal cutting

The metal cutting training curriculum for vocational college teachers is designed to meet the needs for teaching the metal cutting module that is offered by vocational colleges under the MOE. The National Teacher Training Philosophy provides guiding principles for TVET teacher-training for all TVET programs including metal cutting.

Further training is provided to metal cutting teachers through in-service training. Theory and practice are included in the in-service program to provide sufficient knowledge and skills to vocational teachers in order to enhance their teaching abilities in metal cutting as well as competence in metal cutting. To enhance their job competence in metal cutting, the in-service TVET teacher training programs incorporate the need to meet the National Occupational Skill Standards (NOSS), the skills standards under the Ministry of Human Resources referred to earlier in this paper. By combining the standards from the Skills Development Department which are recognised by industries, teachers have industry- accepted competencies and are in good stead to train students to obtain the same recognition from industry.

The in-service training implementation as shown in Figure 2 illustrates the contributors to the curriculum development (instructors, TVET teachers, standards requirements) as well as the components of the resulting curricula (theory, practice and evaluation).

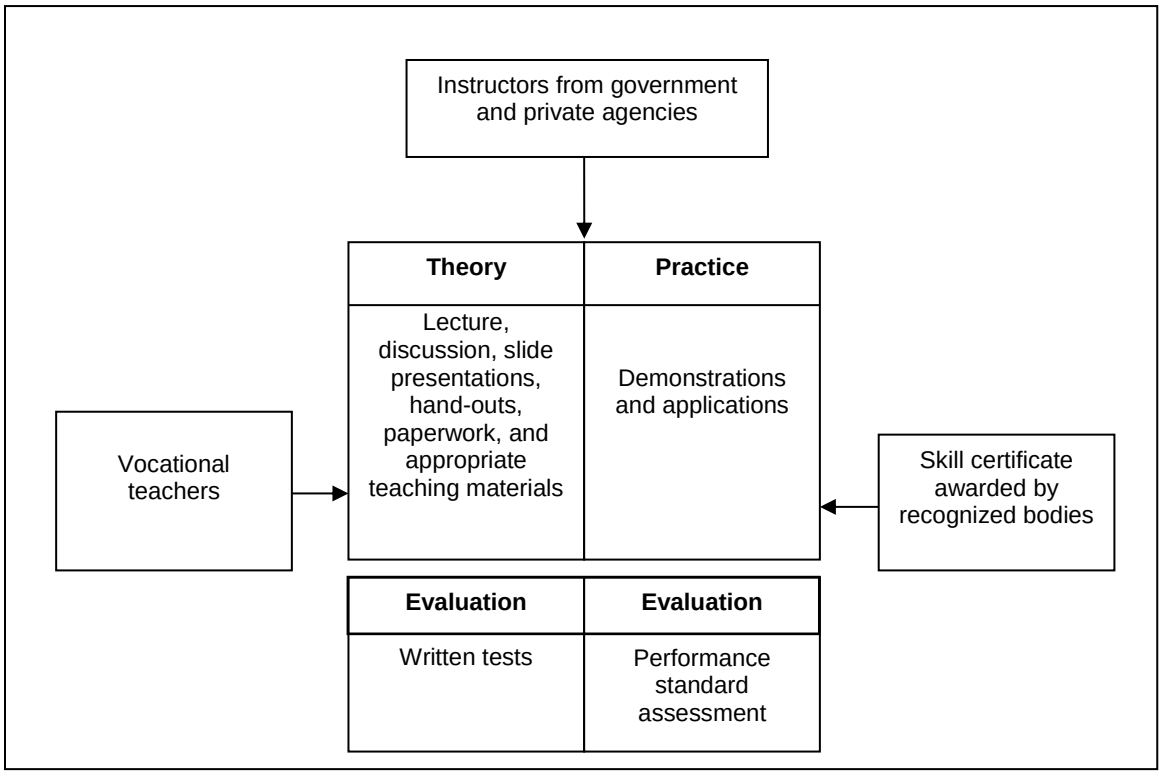

Figure 2: In-service training implementation based on Malaysian vocational teachers qualitative responses

The curriculum for the metal cutting training is equivalent to the module used at vocational colleges with some additional advanced level of knowledge and skills. Furthermore, the curriculum meets the requirements of the MOE and Department of Skill Development, Ministry of Human Resources requirements. Additionally, the vocational teachers gain an insight into the didactical knowledge and competencies of metal cutting. However, one respondent suggests that the practical component of the metal cutting curriculum should be extended so that vocational teachers could achieve greater mastery of metal cutting skills.

Blends of comprehensive theoretical and practical work are used to deliver the content of metal cutting in-service training. Lectures, discussions, slide presentations, hand-outs, paperwork, and appropriate teaching materials are some of the strategies included in the theoretical aspect. Tests are then used by the instructors to measure the level of understanding of vocational teachers. For practical work, instructors prefer to demonstrate and apply types of metal cutting for vocational teachers to perform job-related metal cutting tasks based on specific evaluation of the training. Hence, vocational teachers acquire substantive knowledge and develop useful skills that can be taught to their students. In the end, the participants of metal cutting training will be awarded a certificate by the Skill Development Department, Ministry of Human Resources.

3.5 Selection of participants for further training in metal cutting

Places for in-service training (further training) are limited and thus the selection of teachers for training is very competitive. One of the criteria (in addition to length of service) is that teachers must show potential for developing advanced level competencies which means that they should have some form of certificate that is recognized by the Ministry of Human Resources. The teachers who participate in further training have to undergo the selection process within their respective vocational colleges. In general, vocational teachers who have more than five years of teaching experience have attended a metal cutting in-service training program at least once before.

3.6 Trainees to trainers ratio

The number of participants per training session is often limited to no more than 20 persons to ensure quality training. Thus, based on the focus group discussion, the ratio of trainees per instructor is approximately 20:1.

3.7 Training providers

The responsible departments or institutions that support the metal cutting in-service training programs are from government and private agencies. Among the agencies that work with the MOE in providing metal cutting training to TVET teachers in vocational colleges are the industrial training institutes, Department of Skills Development, Construction Industry Development Board (CIDB), Department and the Advanced Technology Training Centre (ADTEC). Most of these agencies are under the Ministry of Human Resources. Thus, there is close cooperation between the MOE and the Ministry of Human Resources in providing training and developing competencies among metal cutting teachers of vocational colleges.

The selected metal cutting instructors for the in-service training programs are selected from amongst the permanent workers of those training providers. The highest level of academic achievement of instructors is usually bachelor degree level in mechanical engineering/technical skill, while others hold a diploma and/or certificate. Those who are recognized to have good job experiences in metal cutting also have the opportunity to share their knowledge and skills with the participants. Twelve out of the 16 vocational teachers proposed that ideally, there should be at least three instructors present to teach metal cutting during training to ensure that adequate attention can be given to the needs of the trainees to reach the desired competence. Generally speaking, the in-service training duration varies from as short as five days to as long as two years depending on the needs of the teachers, the location of the training (local or overseas) as well as the availability of budget.

3.8 Basic conditions for delivering the curriculum in practice

Trainers are selected from experts in the following categories: experts from industry; from existing instructors in other Ministries or from among teachers under the MOE. The trainers must possess the Malaysian Skills Certificate (SKM) that are at a higher level than the target

level of the trainees. All trainers from the industry must possess SKM level 5. However, trainers from schools may not have the certificate but must give evidence that they have the right competencies, such as the Malaysian Vocational certificates. They are not required to be a degree holder. A training program is attended by around 20 trainees and ranges from 5 days to two years (full-time).

The training organization is hired on an "as needed basis". They can be a private or a government organization. The main requirement is that the training organization has the appropriate facilities to run the training programs. Financing is provided by the MOE or the Ministry of Higher Education since these teachers are under their jurisdictions. Certifications are provided by the MOE or the MOE in collaboration with the training providers, or by the Skills Development Department depending on the terms and conditions of the training.

4 Conclusion

This paper discusses the outcomes of the evaluation of the curriculum for further training in occupational skills for vocational teachers in metal cutting in Malaysia, which is part of a larger study under the RCP research project. According to current practices, TVET teachers are provided with in-service training for further upgrading their competence in metal cutting or welding skills. The quality of in-service training is ensured by limiting the space and maintaining the ratio per training session to no more than 20 persons. The training provider must also fulfill several requirements relating to the physical equipment and trainer expertise in the area. Although, there is no standard curriculum for TVET teachers in the metal cutting occupation, continuous efforts through in-service training are made to support TVET teachers' development of their occupational skills.

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