
Current Development of Vocational Professional Teacher Education in Indonesia

Abstract

The TVET sector plays an important role in the development of human resources in the context of global competition. For this reason, the Indonesian government has issued Presidential Instruction Number 9 of 2016 concerning the revitalization of vocational high schools (known as Sekolah Menengah Kejuruan, or SMK) to improve the quality of human resources and enhance national competitiveness. One important aspect of SMK revitalization entails improving TVET teacher quality. This paper describes the current development process of professionalizing vocational teacher education (Pendidikan Profesi Guru, or PPG) in Indonesia in accordance with the demands of the Fourth Industrial Revolution (also known as Industry 4.0). By law since 2015, professional teacher certificates are obtained through participation in pre-service or in-service PPG programs by candidates who have met the minimum educational requirements of bachelor's degree (S1) or Level IV diploma (D4). The PPG program is implemented by government-approved higher education institutions (known as Lembaga Pendidikan Tinggi Kependidikan, or LPTK) and has a learning load of 36-40 credits. However, the learning load for in-service PPG participants can be reduced through recognition of prior learning (RPL). Previously, there were several ways to obtain a teacher certificate: through direct provision of the certificate, portfolio assessment/RPL, or participation in short education and training courses (Pendidikan dan Latihan Profesi Guru, or PLPG). Since 2020, in-service PPG also takes place through continuous professional development (CPD) in the form of short training courses conducted by the government, schools, teacher associations and/or the private sector. Based on a literature review followed by two online focus group discussions, we found some evidence of innovation in the current PPG model corresponding to the needs of Industry 4.0. However, further innovation is still required through improving cooperation with industry.

Keywords: *TVET reform, vocational high school (SMK), vocational teacher education, Industry 4.0*

1 Introduction

The TVET sector plays an important role in preparing skilled workers to contribute to their countries' economic development. Indonesia needs 58 million skilled workers to achieve its goal of becoming the 7th-ranked economic power in the world by 2030 (McKinsey Global Institute 2012). Focusing on TVET development, teachers play a crucial role in assuring the quality of teaching and learning. The quality of an educational system cannot exceed the quality of its teachers (Barber & Mourshed 2007). For this reason, a key focus of SMK revitalization in Indonesia is to improve the quality of TVET teachers (MoEC 2016a).

Rapid technological change, the phenomenon of disruption and the Fourth Industrial Revolution require various adjustments in the education sector, including in vocational teacher competencies. Teachers must be equipped with future-oriented competencies, such as 21st century skills and a new understanding of literacy covering data literacy, technology literacy and humanity literacy (Aoun 2017). To respond to these challenges, the Indonesian government has been developing a responsive professional teacher education program.

2 Overview of the TVET System in Indonesia

Formal TVET in Indonesia is provided at both secondary and post-secondary levels. At the secondary level, SMKs – which are managed by the Ministry of Education and Culture (MoEC) – offer three-year training programs that lead to secondary-level qualifications. Some SMKs offer a four-year program for selected fields of study. After completion of secondary studies, students can either join the workforce or continue on to higher education via the vocational track. SMK graduates can enrol in three-year diploma programs offered by polytechnics. They can also continue on the professional track to obtain Specialist 1 and 2 (Sp.1 and Sp. 2) qualifications or join the workforce. A range of ministries are responsible for TVET in Indonesia. The most prominent ones include MoEC and the Ministry of Manpower and Transmigration (MoMT), which offers vocational and technical training programs at its training centers known as Balai Latihan Kerja (or BLK). Local governments and private providers also play an important role in TVET delivery (SEA-TVET 2018).

According to Law Number 20 of 2003 concerning the National Education System, SMKs are designed to prepare graduates to work in certain fields. In the context of a rapidly changing work environment, this means SMKs must prepare graduates to be job-ready, competent and adaptive to change. Over the past decade, initiatives have been implemented in Indonesia to improve TVET responsiveness to changes taking place in the labour market, as well as to reduce skills gaps and mismatches between the competences provided by TVET institutions and those required by industries. These initiatives have included: (1) shifting the TVET paradigm from a supply-based to a demand-based system; (2) increasing TVET focus on practical skills delivery, in addition to theoretical training; (3) prioritizing skills development in economically vibrant sectors and occupations; and (4) the SMK Revitalization Program, which seeks to increase the employability and competitiveness of the Indonesian labor force at national, regional and global levels (Paryono 2015).

Table 1 provides a summary of the TVET landscape in Indonesia. It shows that Indonesia has 14,157 SMKs, consisting of 10,575 private SMKs and 3,582 public SMKs, serving a total of 5,034,496 students. Large SMKs, with more than 1,000 students, play a significant role in delivering TVET in Indonesia: while they make up only 9.01% of all SMKs, they serve 36.29% of the country's SMK students. Meanwhile, small SMKs, with less than 200 students, play a more marginal role: they comprise more than half (51.42%) of all SMKs in the country, but serve only 13.31% of SMK students. These trends suggest that there are more SMKs than are needed in Indonesia.

Table 1: **Data of SMK according to the number of students (MoEC 2019)**

SMK classification based on number of students	Number of SMK	Number of students	% number of SMK	% number of students
>1000	1,275	1,826,811	9.01	36,29
801-999	566	505,310	4.00	10,04
601-800	827	570,771	5.84	11,34
401-600	1,289	633,306	9.11	12,58
200-400	2,921	828,257	20.63	16,45
<200	7,279	670,041	51,42	13,31
Total	14,157	5,034,496	100.00	100.00

Table 2 presents data on the ratio of teachers to students in SMKs, broken down by vocational field (MoEC 2019). Although the ratio of teachers to students across all vocational fields is relatively good, many rural SMKs do not have enough vocational teachers in certain fields such as maritime, arts and creative industries, agribusiness and agroindustry, and energy and mining. In addition, many SMKs continue to offer technology and engineering, business and management and information and communication technology programs, despite low graduate employability rates from these programs. This signals a need to ensure that SMKs offerings are closely aligned to labor market needs. In addition, training quality may be an issue contributing to low employment levels among SMK graduates.

Table 2: **Data of SMK students and teachers according to vocational field of study (DAPODIK 2019)**

No	Vocational field*	Number of SMK	Number of students	Number of teachers	Student-teacher ratio
1	Technology and engineering	6,556	1,667,909	53,476	31
2	Business and management	6,491	1,225,561	41,941	29
3	Information and communication technology	8,086	1,170,211	34,088	34
4	Tourism	2,325	417,382	13,230	32
5	Health and social works	1,743	208,522	8,462	25
6	Agribusiness and agrotechnology	2,001	219,704	10,397	21
7	Maritime	873	88,876	5,157	17
8	Arts and creative industries	505	66,670	3,131	21
9	Energy and mining	189	14,551	584	25
Total		14,234	5,079,386	170,466	30

*One SMK can open more than one field of study.

To assess TVET quality, in 2018 MoEC carried out an evaluation of SMKs' achievement of eight national education standards, as set out in MoEC Regulation Number 34 of 2018 concerning national standards for SMK (MoEC 2019). The evaluation showed that, on a scale of 1 to 10, the average SMK score for each standard was as follows:

- graduate competency standard (6.38);
- content standard (5.58);
- process standard (6.50);
- education assessment standard (6.11);
- educators and education staff standard (3.54);
- education facilities and infrastructure standard (4.39);
- education management standard (5.83); and
- financing standard (5.80).

While the average overall SMK score of 5.29 in 2018 was higher than in previous years (4.60 in 2017 and 4.10 in 2016), the standard of teachers and education staff was lower than that of all other standards, signaling that TVET teacher training is an area that requires government attention.

According to Law Number 14 of 2005, teachers are professional educators with the main task of educating, teaching, guiding, directing, training, assessing, and evaluating students through formal education, at early childhood, primary, and secondary education levels. Furthermore, teachers should have relevant academic qualifications and competencies. The minimum educational requirement for SMK teachers is either an undergraduate degree (S1) or a Level IV diploma (D4). In other words, to become a qualified TVET teacher, one must complete a four-year university degree or four years of higher education or obtain a Level 4 diploma from a polytechnic. Teacher certificates are given to teachers who have met the minimum educational requirements and possess the necessary professional, pedagogical, personal, and social competencies.

Teacher certification is one strategy to ensure that teachers have the competencies needed to deliver high-quality, relevant training. From 2005 to 2015, teacher certification could be obtained in several ways: (1) through direct provision of the certificate (a restricted practice that took place at the beginning of teacher certification in 2005); (2) through portfolio assessment; or (3) by participating in short education and training courses (Pendidikan dan Latihan Profesi Guru, or PLPG). However, since 2015 teacher certificates can only be obtained through successful completion of a professional vocational teacher education (Pendidikan Profesi Guru, or PPG) program.

3 New Challenges Presented by the Fourth Industrial Revolution

The need to improve the quality and relevance of training received by TVET students has become more urgent, as well as more complex, in the context of rapid technological change and disruptions in the era of Industry 4.0. Many jobs that currently exist are forecast to

disappear or be replaced by robots and intelligent machines (McKinsey Global Institute 2017). About 65% of children entering primary school today will have a job that does not yet exist (World Economic Forum 2016). The next industrial revolution will likely bring a higher level of automation and interconnectivity in the manufacturing process. The tools, technologies and equipment to be used are expected to be different from what is present today. Smart machines will coordinate manufacturing processes by themselves, smart service robots will collaborate with workers on assembly lines, and smart transport systems will transfer goods from one place to another. Smart devices like tablets, wearables, etc., will be used to gather and analyze real-time information (Berger 2019).

TVET systems need to prepare in order to adapt and respond to these developments. For example, it is widely recognized that new skills, called 21st century skills, are needed for graduates to be able to compete in the world of work (Wagner 2010; Trilling & Fadel 2009; Barry 2012; Suto 2013). The 21st century skills needed for Industry 4.0 include, but are not limited, to the following:

- Skills in oral and written communication;
- Problem solving;
- Ethics and professionalism at work;
- Teamwork and collaboration;
- Ability to use new technology effectively;
- Project management and leadership;
- Agility and adaptability;
- Initiative and entrepreneurship;
- Ability to access, analyze and synthesize information;
- Curiosity and imagination;
- Productivity and accountability; and
- Innovative, global citizenship, higher order thinking.

In addition, the competence profile of TVET graduates in Indonesia must include (CMoE 2017):

These TVET graduate characteristics have to be formulated as learning outcomes in both TVET programs and PPG programs.

At least three major social challenges have an impact on future skills and competences in Indonesia. First, the Fourth Industrial Revolution relies on a cyber-physical system that will radically change the way that humans live, work and communicate. It is estimated that 35% of current basic skills will no longer be important and will be replaced by new basic skills needed for the future of work (Schwab 2016). The second challenge is globalization. For example, the ASEAN Economic Community (AEC), having started at the end of 2015, allows increased labor mobility and free competition across ASEAN member countries. By 2025, labor mobility among ASEAN member countries is forecast to extend to around 14.2 million people. The third challenge is to develop a “golden generation” in Indonesia by 2045 (100 years from independence day) by utilizing the momentum of the demographic dividend. About 70% of

Indonesia's population is of productive age, and this new generation should be capable of maintaining unity in Indonesia's diversity, while at the same time creating social justice and national prosperity. They should also have the capacity to transform the country's rich natural and cultural diversity into a motor for economic competitiveness (McKinsey Global Institute 2012). The presence of the millennial generation in Indonesia makes this vision feasible, since they are a generation of smart, fast learners and active users of social media, craving flexibility and freedom to work anywhere, anytime and with anyone (World Economic Forum 2016).

However, preparing the next generation for the future of work requires smart planning. To develop a TVET system that can meet future labor market demands, two main issues need to be addressed: first, integrating the national TVET system to improve links between government, education and training providers, and industry; and second, improving the quality and flexibility of teaching and learning in TVET institutions to ensure that students become more engaged in learning processes and will learn effectively (SEA-TVET 2018).

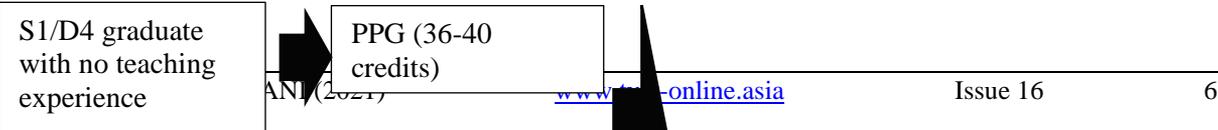
4 Professional Vocational Teacher Education (PPG) in Indonesia

In response to the challenges set out above, the Indonesian government issued Presidential Instruction No. 9 in 2016 concerning Vocational School (SMK) Revitalization, which aims to improve the quality of human resources for the nation's competitiveness. SMK revitalization includes the following aspects: (1) curriculum development, (2) learning innovation, (3) development of TVET personnel, (4) school partnership with industry and higher education institutions, (5) standardization of facilities and infrastructure, and (6) development of TVET institutional management (MoEC 2016a).

For reasons already outlined, the development of TVET personnel – in particular, TVET teachers – is an important aspect of the SMK revitalization. Since 2015, teacher certificates are awarded based on successful completion of a professional vocational teacher education (PPG) program. PPG consists of one year of training with a learning load of 36-40 credits and is implemented by MoEC-approved higher education institutions (Lembaga Pendidikan Tinggi Kependidikan, or LPTK) in cooperation with partner schools, through a combination of online learning using a Learning Management System (LMS) platform and offline training in an LPTK classroom.

At present, there are two ongoing models of PPG in Indonesia (see Figure 1). The first model is pre-service PPG for S1 and D4 graduates who have not yet started teaching. The second model is in-service PPG for teachers who are already active in teaching, but do not yet have an educator certificate. At present, many in-service vocational teachers do not have a certificate of expertise and teacher certificate. Furthermore, the quality of PPG programs offered by some LPTKs need to be improved in terms of lecturer quality, curriculum and quality assurance (MoEC 2016b).

Pre-service



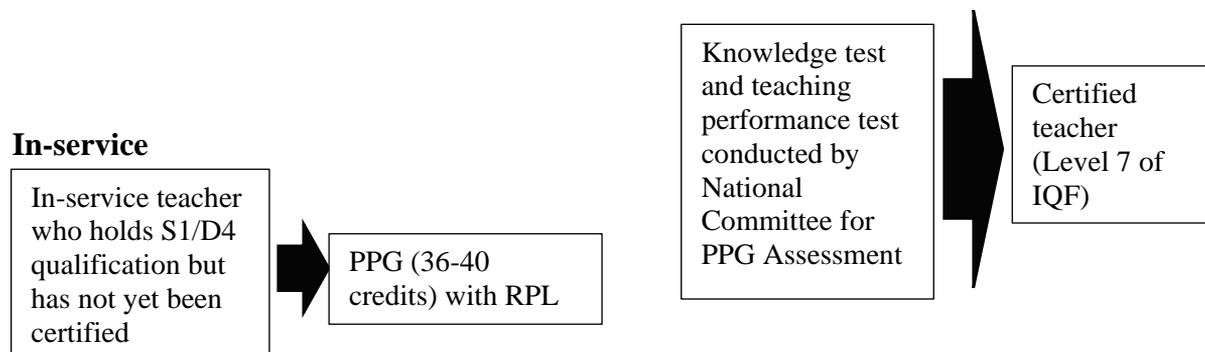


Figure 1: A schematic diagram of the pre-service and in-service PPG Model

Pre-service and in-service PPG programs consist of the same three courses – namely, deepening of pedagogical and content knowledge, development of lesson plans and clinical practicum – which build on each other to develop learners’ holistic competencies (MoEC 2020a; MoEC 2020b). However, the load of credits between pre-service and in-service PPG programs differ, reflecting the two groups’ distinct needs for competence strengthening. In addition, in-service PPG participants can reduce their learning loads through recognition of prior learning (RPL).

The course on deepening of pedagogical and content knowledge seeks to improve learners’ understanding of their profession, pedagogy and field of study, covering essential concepts to advanced material. The module also covers learning theory, educational psychology, socio-cultural aspects and managing diversity in the classroom. The course on developing lesson plans is implemented in the form of a workshop, followed by peer review and reflection, to prepare learners for their clinical practicum in schools. The module seeks to improve learners’ competencies in producing lesson plans and teaching materials, use of learning technology and ability to conduct assessments. The course on clinical practicum facilitates the development of professional skills. Learners carry out non-teaching tasks to do with class and school administration, co-curricular and extracurricular activities, and other school-related activities. For vocational fields, non-teaching activities include visits to relevant industries. All activities end with regular periods of reflection.

For pre-service PPG, the learning load is generally 38 credits, distributed as follows: deepening of pedagogical and content knowledge (2 credits), development of lesson plans (12 credits) and clinical practicum (24 credits) (MoEC 2020a). For in-service PPG, the learning load is generally 36 credits, of which 24 credits may be gained through RPL from a minimum of 5 years’ teaching and non-teaching experience in schools. The remaining 12 credits are earned as follows: deepening of pedagogical and content knowledge (5 credits), development of lesson plans (3 credits) and clinical practicum (4 credits) (MoEC 2020b).

The different loading of credits between in-service PPG and pre-service PPG reflects the different needs for competence strengthening between the two groups of learners. In-service teachers tend to be weaker in pedagogy and content knowledge than they are in planning and

implementing lessons in school. Pre-service teachers tend to lack experience in planning and implementing learning, but are more up to date in terms of pedagogy and content knowledge.

Since 2020, in-service PPG also takes place through continuous professional development (CPD) in the form of short training courses conducted by the government, schools, teacher associations and/or the private sector. Furthermore, since PPG program year 2020 which at the time of writing is still running, a future teacher is expected to be able to carry out educational learning by integrating HOT (higher order thinking) skills with the TPACK (Technological and Pedagogical and Content Knowledge) approach as a means of responding to Industry 4.0 (MoEC 2020a)

5 Potential of the PPG model for addressing the needs of Industry 4.0

Based on a literature review followed by two online focus group discussions on the topics of professional vocational teacher education and vocational teacher competencies in the era of Industry 4.0, we have found some evidence of innovation in the current pre-service and in-service PPG model. In terms of educational philosophy, there is recognition that PPG is an important instrument for human resource development. The competence development of TVET teachers is supported by a focus on quality regarding input, PPG institutions, curriculum, lecturers and tutors. In this context, there is now refresher training (CPD) for lecturers and tutors, as well as an improvement in the quality of LPTKs as PPG host institutions. The education ecosystem has also been improved by strengthening partnerships among PPG stakeholders, including MoEC, partner schools and LPTKs. In addition to the new PPG model, Indonesia also adopts, adapts and implements best practices in professional teacher education from other countries.

The new PPG model is also in line with wider MoEC aims, including: (1) implementing the concept of independent learning in PPG; (2) strengthening teachers' literacy, numeracy and character-building skills; and (3) increasing participation of the community in improving the quality of teacher education. The PPG model also reinforces aspects of teacher leadership in learning by building teachers' ability to reflect on their learning and to understand the socio-cultural backgrounds of their students.

In terms of learning platforms, the new PPG model is implemented using an online platform, which has allowed PPG programs to continue despite the Covid-19 pandemic and has served to encourage further use of ICT in education. PPG activities are carried out with the help of a Learning Management System (LMS) using a combination of synchronous and asynchronous learning modes.

However, for vocational PPG, further innovation is still necessary, especially with regards to improving cooperation with industry. Participants in the two online focus group discussions – which were held on 7 September and 9 September 2020 and included 20 representatives from MoEC, LPTKs, SMKs, local government and the private sector – identified the following constraints regarding the current PPG program:

- 1) Low level of industry engagement. At present, industry's role in providing practical industrial experience is still limited.
- 2) MoUs between SMKs and industry and certificates of expertise provided by the professional certification body are usually only valid for 5 years. Furthermore, the extension procedure sometimes requires complicated steps.
- 3) Lack of clear and executable government policies at national and provincial levels.

6 Conclusion

The SMK revitalization program presents a valuable opportunity to improve the quality of TVET in Indonesia. In particular, the professional vocational teacher education program addresses the urgent need for improvements in the quality of TVET teaching. The evidence presented in this article suggests that recent developments in the PPG model may be expected to result in quality improvements in the standard of TVET teaching, which should in turn lead to improvements in the quality of human resources contributing to economic development in Indonesia. However, further innovations are needed to engage industry in PPG processes.

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