Challenges of initial TVET teacher training in Indonesia:

Empirical Analysis of Skills Deficit of Mechanical Engineering Teachers

Dissertation

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Abstract

The fulfilment of competent secondary vocational school (SMK) teachers needs in accordance with the requirements and standards of teacher competence in Indonesia has not yet been carried out according to expectations. This dissertation seeks to find out more about what skills deficit are possessed by prospective vocational teachers who have just graduated from university and to find out more deeply what are the factors that influence these skills deficit. Prospective vocational teachers who will serve in secondary vocational schools (SMK's) at this time need a long adaptation process before being able to teach at each level of competence according to their competence. Based on the research question, "what kind of skills deficit and its factors influence, owned by prospective mechanical engineering teachers related to the school needs for competent teachers in West Java?" the implementation of the teaching internship program for prospective vocational teachers as well as the learning process carried out at the TVET faculty will be the starting point for this dissertation. Problem-Centred Interviews (PCI) have been conducted with the supervisor teachers in the teaching internship program (n=10) and lecturers who teach practical courses at the TVET faculty (n=10) with an approach to the process carried out on teaching internship program activities for prospective vocational teachers in SMK's and an approach to the practical learning process carried out at the TVET faculty in order to prepare prospective vocational teachers according to the needs of SMK's. And then evaluated using the methods of inductive category formation, the forms of analysis of qualitative content analysis about kind of skills deficit and its factors influence reconstructed, interpreted and summarized in a catalogue of criteria. From the result of the analysis, it is found out that the prospective teachers ready to teach in basic competence subject at schools and not yet ready for advanced level of competence in respective subjects. The interview results also found that there is no systematic approach to assure the quality of the graduates based on the standard until now there is no third-party assessment for university students so for that reason there is no assurance that the prospective teachers have enough competence for becoming a TVET teacher in SMK's.

Key Words: Initial TVET Teacher training, Skill deficit, Teaching internship, empirical research.

List of Abbreviation

AEC : ASEAN Economic Community

BAN : National Accreditation Board

BLK : Job training centers

BNSP : National Professional Certification Agency

BPS : Bureau of Statistic

CBT : Competence Based Training

CTE : Career and Technical Education

D1 : Diploma 1

D2 : Diploma 2

D3 : Diploma 3

D4 : Diploma 4

DPR-RI : Indonesia Parliament

ECE : Early childhood education

FKIP : Teacher education and training faculty

FPTK : Vocational education and technology faculty

IKIP : Institute of teacher training and education

IPG : Institute of teacher education

KKG : Teachers working group

KKN : Student work lecture

KKNI : Indonesia national qualification framework

KPK : Corruption Eradication Commission

LKP : Course and training institution

LPK : Job training institution

LSP : Professional certification agency

MA : Islamic senior high school

MAK : Islamic vocational school

MGMP : Subject teachers deliberations

MI : Islamic primary school

MOEC : Ministry of education and culture

MOMT : Ministry of manpower and transmigration

MORA : Ministry of religion affair

MTS : Islamic Junior high school

OE : Occupational education

PCI : Problem-Centered Interview

PKB : Sustainable professional development

PKBM : Community learning center

PP : Government regulation

PPL : Field experience practice

PPG : Professional teacher program

PTN : State university

PTPG   : Teacher education college

PTS   : Private university

P4TK   : TVET teacher training centers

RPP   : Lesson plan

SD   : Primary school

SKS   : Semester credit system

SKB   : Learning activity center

SKKNI   : Indonesian National competency standard

SMP   : Junior high school

SMA   : Senior high school

SMK   : Secondary vocational school

SISDIKNAS : National educational system

Sislatkernas : National work training system

S1   : Bachelor degree

S2   : Master degree

S3   : Doctoral degree

TK   : Kindergarten

TPT   : Open Unemployment rate

TVET   : Technical vocational education and Training

UU   : Law

WTO   : World Trade Organization

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1. Elaboration of research question

The rapid development of the economic and technological sectors in this era of globalization increasingly demands the availability of qualified and competent Human Resources (HR) in all business sectors, to be able to face increasingly sharp competition, causing the need to increase the capacity of local human resources so that they are recognized as having competence in their respective fields. Respectively to avoid marginalization of local labor. Technical and vocational education with regards to individual occupational preparation in addition to national development is well recognized worldwide today. In fact (TVET) has an important role to play in preparing young people for the jobs of tomorrow (Atchoarena & Delluc, 2002, p.15). In Indonesia Vocational education and training tends to be fragmented, even at school level. Responsibility for vocational education and training shared across two ministries (ministry of education and culture (MOEC) and ministry of labor and transmigration. ministry of education and culture (MOEC) responsible in secondary vocational schools (SMK) for formal education program and course and training institutions (LKP) for informal education program while ministry of labor and transmigration responsible in job training program with several training centers (BLK) across Indonesia and private job training institution (LPK) there are multiple course offerings, and provision is dominated by the private sector. The Central Bureau of Statistics (BPS) stated that Secondary Vocational School (SMK) graduates dominate the number of unemployed people in Indonesia, which reached 6.88 million people in February 2020. SMK graduates contributed to the Open Unemployment Rate (TPT) according to education reaching 8.49%, decreasing from the year 2019 which reached 8.63%.[1] The problems that recur every year make the government try to make improvements that are deemed necessary. However, to change SMKs to have the quality assurance expected by the industry, radical policies are needed to solve the problems that occur. Therefore in 2016, the president as the holder of the highest government power in Indonesia issued Presidential Instruction Number 9 of 2016 concerning Revitalization of Secondary Vocational Schools (SMK's) in the Context of Improving the Quality

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[1] Source: https://bps.go.id/subject/6/tenaga-kerja.html#subjekViewTab3, 2021.

and Competitiveness of Human Resources in Indonesia. The Presidential Instruction was issued on 9 September 2016 in Jakarta addressed to 12 Working Cabinet Ministers (Minister of Education and Culture, Coordinating Minister for Human Development and Culture, Minister of Home Affairs, Minister of Finance, Minister of Research, Technology and Higher Education, Minister of Industry, Minister of Manpower. Minister of Transportation, Minister of Marine Affairs and Fisheries, Minister of state owned enterprises (BUMN), Minister of Energy and Mineral Resources and Minister of Health), 34 Governors, and National Professional Certification Agency (BNSP) who instructed: (1) to take the necessary steps according to their duties , functions and authorities of each to revitalize SMK in order to improve the quality and competitiveness of human resources, (2) compiling a workforce requirement map for SMK graduates according to their respective duties, functions and authorities based on the Vocational School development road map, and (3) accelerating competency certification for SMK graduates, educators, and vocational education staff and accelerating SMK licensing as a first party professional certification body. And specifically instructed the governor to carry out vocational restructuring which includes vocational programs that were opened and vocational locations, develop superior vocational schools and provide facilities for the community to obtain vocational education services in accordance with the potential of their respective regions.

Revitalization is a process or method and action to revive something that was previously empowered so that revitalization means making something or action vital, while the word vital has a very important meaning or is very necessary for life and so on. According to government evaluation, there are six problems in revitalizing SMK. First, the implementation of the curriculum for SMK level is still rigid because the curriculum prepared is based on standards but is generic, often fails to be understood by curriculum implementers at the educational unit level. As a result, it is difficult to meet the need for a workforce that is ready for use by the business and industrial world. Many people think that the curriculum and syllabus at SMK are determined unilaterally by the Ministry of Education and Culture. Second, the availability and competence of teachers that are not in accordance with the subjects being handled in each expertise program (miss match). Third,

cooperation between SMK and the business world as well as the industrial world (DU / DI) as a place of practice for students is not optimal. Fourth, the results of the competency test conducted for SMK graduates have not been able to meet the needs of related industry. Fifth, the ratio of students to the tools or the availability of facilities and infrastructure for practice is far from ideal according to the requirements. Sixth, the polemic of SMK financing, both in terms of budget sources from the government and from the community.[2] This hinders statistical generalizations and sector analysis. Nevertheless, in line with trends worldwide, access to vocational secondary education is affected by the demand for its programmes and the level of resourcing available.

Regarding to that increasing of interest of young people to entering vocational school, quality of the vocational teachers is one thing we have to consider seriously, TVET Teachers training has been the most important thing to developed recently in Indonesia, TVET teacher training in Indonesia is the responsibility of Ministry of Education and Culture under Directorate General of Higher Education for initial TVET Teacher Training with several Bachelor Degree programs in University and Directorate General of Vocational Education responsible for further training for TVET teachers with several programs in TVET teacher training institutions.

Until now there have been many students who have graduated from the university as prospective teachers, but the facts prove that there is still a practical skill deficit from these graduates which results these graduates still cannot teach properly in practical subjects in school, on this basis this research is conducted to determine the factors of skill deficit of prospective teachers in mechanical engineering field. Until now, no study has been made on the skill deficits from prospective TVET teacher graduated from university. There are several problems faced in the learning process in initial vocational teacher programs implemented at universities. The problem identification in this dissertation is, there is a discrepancy between the study programs at the Technical Vocational Education Faculty in the Mechanical Engineering Department at Indonesia University of Education (UPI) and the study programs in vocational high schools, with the difference in the study

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[2] Source: https://mediaindonesia.com/opini/256776/dilema-program-revitalization-smk, 2019.

program, how can prospectively graduates from university teach in relevant fields in vocational high schools in Indonesia.

Thus, this dissertation is focused on comprehending one main research question: what kind of skills deficit and its factors influence, owned by prospective mechanical engineering teachers related to the school needs for competent teachers in West Java? To make it easier to answer the main questions above, two sub research questions were developed, which is:

- What kind of skills deficit of prospective mechanical engineering teachers in teaching internship program at schools?
- What factors influence of skills deficit of prospective mechanical engineering teachers?

For a large country like Indonesia, the challenge in education and training prospective vocational teachers always arises from time to time. It will need the consistency of continuous development following the schools and industry demands. In other words, the challenge to guarantee the quantity and quality of vocational teachers is a serious challenge faced by Indonesia in the future. The development of initial vocational teacher training is defined as an effort to improve the level or professional degree of a vocational teacher related to their ability to master teaching materials or teaching methodologies, as well as the professionalism of teachers in learning technical competence following their areas of expertise, motivation, and commitment in carrying out their duties as teachers. Professional teachers are teachers who realize that they are individuals who are called to assist students in the learning process so that they continually need to develop their knowledge and skills about how students should learn to achieve maximum results.

The implementation of pre-service TVET Teacher training in Indonesia has been carried out in Indonesia since the 60s along with the growing number of schools throughout the country, especially in the vocational field, Indonesia has several times changed the education system and training of prospective vocational teachers to meet the needs of schools. In practice, the implementation of pre-service for prospective vocational teachers is the responsibility of the university in accordance with its authority. Currently, the number of universities in Indonesia that has study programs in the field of vocational teachers is still very limited due

to several factors, such as the high cost of facilities and infrastructure that must be provided, supporting human resources, and the interest of young Indonesians to become vocational teachers as a career choice.

Various problems related to the Initial TVET Teacher training cannot be solved in one study so in this study the focus will be in the implementation of the practical component learning process at the University as well as how the implementation of the students carry out internships as teachers in secondary vocational schools (SMK's). here are the objective of the study:

1. To investigate the practical learning process activity of initial vocational teacher training program in Indonesia.
2. To investigate the teaching internship program activity for prospective vocational teachers in secondary vocational school in Indonesia.
3. To finding the factors influence of practical skill deficit from prospective teachers.

The results of the dissertation carried out are expected to be a reference for improvements in the learning process carried out in the initial TVET teacher training program, the expected results are:

1. Finding the factors influences of skill deficit from prospective TVET Teachers.
2. Finding the solution to connect initial TVET Teacher education and training and learning process in secondary vocational school in Indonesia.

This dissertation is divided into 7 chapters. The first chapter described the introduction about the dissertation including problem identification and develop a research question. The second chapter provides the reader with an overview of the political system, history, geography, and economy in the Republic of Indonesia. This chapter also discloses more detailed information on the Indonesian general education system and a brief description and discussion about its different levels (basic education, elementary education, secondary level education and higher

education) are introduced. The following sub chapter is exclusively dedicated to the Indonesian vocational and training system. This section of the dissertation describes and explains some of the key terms involving vocational education and training in Indonesia, seeks to explain facts regarding the reputation of VET and its relation to historical issues and political reforms. This chapter is followed by a section entirely dedicated to providing sufficient information about initial TVET teacher training system in Indonesia. The third chapter provides the reader with a several theoretical backgrounds related with vocational education in international context also related TVET teacher qualification and initial TVET teacher training. The fourth chapter entails the research method and approach in this dissertation, describes data collection and tackles other methodological aspects of the study. It explains in detail the study area, sample and target groups and data analysis techniques. Chapter fifth deals with presentation of the results finding. Chapter sixth shows the discussion of the result. Chapter seventh describes conclusions, and recommendations.

2. General facts about Indonesia and its education system

2.1 General Information about Indonesia and Its Population

Indonesia is the largest country in Southeast Asia, with a maximum dimension from east to west of about 3,200 miles (5,100 km) and an extent from north to south of 1,100 miles (1,800 km). It shares a border with Malaysia in the northern part of Borneo and with Papua New Guinea in the centre of Papua Island. Indonesia is composed of some 17,500 islands, of which more than 7,000 are uninhabited. Almost three-fourths of Indonesia's area is embraced by Sumatra, Kalimantan, and Papua; Celebes, Java, and the Moluccas account for most of the country's remaining area.

The major Indonesian islands are characterized by densely forested volcanic mountains in the interior that slope downward to coastal plains covered by thick alluvial swamps that, in turn, dissolve into shallow seas and coral reefs. Beneath this surface, the unique and complex physical structure of Indonesia encompasses the junction of three major sections of the Earth's crust and involves a complicated series of shelves, volcanic mountain chains, and deep-sea trenches. The island of Borneo and the island arc that includes Sumatra, Java, Bali, and the Lesser Sunda chain sit on the Sunda Shelf, a southward extension of the continental mass of Asia. The shelf is bounded on the south and west by deep-sea trenches, such as the Java Trench (about 24,440 feet [7,450 meters] deep at its lowest point), which form the true continental boundary. Papua and its adjacent islands, possibly including the island of Halmahera, sit on the Sahul Shelf, which is a north-western extension of the Australian continental mass; the shelf is bounded to the northeast by a series of oceanic troughs and to the northwest by troughs, a chain of coral reefs, and a series of submarine ridges. The third major unit of the Earth's crust in Indonesia is an extension of the belt of mountains that forms Japan and the Philippines; the mountains run southward between Borneo and Papua and include a series of volcanoes and deep-sea trenches on and around Celebes and the Moluccas.[3]

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[3] Source: https://www.britannica.com/place/Indonesia.

Figure 2.1 Map of Indonesia[4]

Indonesia declared itself independent from its colonial ruler, the Netherlands, in 1945 and was recognized by the United Nations (UN) in 1950. The country's post-independence President, Sukarno, was toppled in 1967 by General Suharto. Suharto's New Order regime lasted until 1998 when an economic crisis and a popular uprising forced him to step down. Reforms since then have consolidated multiparty democracy, with five presidents over the past 21 years. Indonesia's Constitution was adopted in 1945 and has remained in force ever since, except between 1949 and 1959. As part of the post-1998 democratic reforms, it was amended four times between 1998 and 2002. Among other things, these amendments require the president to be directly elected by the people (instead of the Parliament, as before), and add clauses protecting human rights such as freedoms of expression, association, and religion. Until his downfall in 1998, General Suharto ruled Indonesia with an iron fist. Since then, a series of reforms have transformed his authoritarian 'New Order' into the world's third largest democracy (and largest Muslim democracy). Indonesia has a presidential system in which a directly elected president serves as both head of state and of government. A maximum two-term limit on the presidency helps to ensure a peaceful alternation of power. Also directly elected, the House of Representatives (the lower house of

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[4] Source: http://www.maps-of-the-world.net/maps-of-asia/maps-of-indonesia/, 2016.

the bicameral People's Consultative Assembly) has asserted itself as a strong and independent institution. There are nine parliamentary parties, none of which holds a majority, obliging the government to seek support from a broad coalition. Despite the success of Indonesia's political reforms, its commitment to democratic values cannot be taken for granted. Although Indonesia has traditionally been a tolerant, multicultural society, a rising tide of Islamic populism threatens to disrupt the delicate balance between the country's Muslim majority and minorities such as Christians and Buddhists. The Corruption Eradication Commission (KPK) has had some success in tackling endemic graft in the country's courts, local governments, and Parliament; however, the latter recently voted to weaken the KPK's powers. While trust in democratic institutions is declining, the military – whose commitment to democratic values is often questioned – is becoming increasingly influential in the development of politics in Indonesia.[5]

Indonesia's national motto "unity in diversity" (Bhinneka Tunggal Ika) reflects the multitude of ethnic, cultural, and linguistic varieties that can be found within the boundaries of a nation state that is the world's largest archipelago. Indeed, when you imagine an animist Papuan (in the far east of Indonesia) meeting a Muslim from Aceh (in the far west) there are more differences - in terms of religion, clothes, lifestyle, tradition, native language, etc. - between both persons than there are similarities.

This diverse cultural makeup of Indonesia is the result of a long process of colonization initiated by the Dutch. In a timespan of about three centuries this small European nation managed to (gradually) expand its political power in the Archipelago - conquering the various indigenous kingdoms - until the present-day boundaries were established. In other words, during the formation of the Dutch colonial territory in Southeast Asia all these diverse cultures became part of a single political power that was later inherited by the Indonesian nationalists after Independence in 1945.

On the one hand, cultural diversity is a blessing for Southeast Asia's largest economy. Each culture offers something interesting, and this is what attracts

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[5] Source:
https://www.europarl.europa.eu/RegData/etudes/BRIE/2020/646149/EPRS_BRI(2020)646149_EN.pdf, 2020.

millions of foreign tourists to Indonesia every year (hence tourism is an important foreign exchange earner). For example, cultural relics such as the Borobudur and Prambanan in Central Java and Yogyakarta but also contemporary culture such as Balinese Hinduism are reasons to book a ticket to Indonesia. On the other hand, having a multitude of different beliefs (religions), traditions, ethnics and cultures also implies having difficulties in terms of governance. In fact, on various occasions there have been violent clashes between different groups within Indonesia that had their roots in ethnic or religious differences, events that undermined Indonesia's national motto.

Indonesia consists of 34 Provinces and the official language is Indonesian with each region having its own regional language. The Central Statistics Agency (BPS) recorded data on the population in Indonesia as of September 2020 as many as 270.2 million people. This figure is an increase of 32.57 million people from the total population of Indonesia in 2010 which was only 237.63 million people. On average, every year in the last decade, Indonesia's population has increased by 1.25%. The growth rate was lower for the period 2000-2010, where the average annual population growth reached 1.49%. The Indonesian population can be considered young for 38,82% of its population is younger than 24 years old meanwhile, the productive population between the ages of 15-64 years is 70.72%. The largest population of Indonesia is in Java, reaching 151.6 million people. This figure is equivalent to 56.1% of the total population in Indonesia. Sumatra occupies the second highest number with 58.6 million people (21.68%), Sulawesi 19.9 million people (7.36%), Kalimantan 16.6 million people (6.15%), Bali and Nusa Tenggara 15 million people (5.54%), and Maluku and Papua 8.6 million people (3.17%).[6]

The age and gender structure of a population are one of its most important and formative features because nearly all demographic characteristics and processes vary by age and gender. Age and gender composition are also revealing in that it reflects those demographic characteristics and processes. Population pyramid chart graphics can help us visualize and more easily understand age-gender structure -- and how it is changing over time.

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[6] Source: https://www.bps.go.id/. 2021.

Population pyramids for 2010 and 2050 are shown below for Indonesia with associated population by age-gender tabular data. A top-heavy pyramid suggests negative population growth that might be due to many factors, including high death rates, low birth-rates, and increased emigration. A bottom-heavy pyramid suggests high birth-rates, falling or stable death rates, and potential for rapid population growth. The population pyramid shows a male population bar chart (left side of the pyramid, blue) symmetrically with a female population bar chart (right side of the pyramid, light red). Each bar shows the population by 5-year age group, 0-4 years to 80-84 years and 85 years and over.[7]

Age Group	Male Population	Pct	Female Population	Pct
Total	121,700,343	50.0	121,722,396	50.0
0- 4	11,335,910	4.7	10,915,482	4.5
5- 9	11,573,875	4.8	11,174,775	4.6
10-14	11,582,322	4.8	11,208,879	4.6
15-19	10,910,167	4.5	10,551,208	4.3
20-24	10,435,596	4.3	10,056,588	4.1
25-29	10,459,391	4.3	10,038,902	4.1
30-34	10,422,714	4.3	9,869,792	4.1
35-39	9,989,845	4.1	9,465,053	3.9
40-44	8,307,190	3.4	7,665,839	3.1
45-49	6,735,809	2.8	7,118,563	2.9
50-54	5,548,445	2.3	6,755,025	2.8
55-59	4,748,962	2.0	5,073,617	2.1
60-64	3,011,772	1.2	3,403,188	1.4
65-69	2,774,496	1.1	3,293,553	1.4
70-74	1,911,987	0.8	2,380,871	1.0
75-79	1,133,086	0.5	1,524,149	0.6
80-84	605,576	0.2	855,915	0.4
85+	213,200	0.1	370,997	0.2

Indonesia, 2010, Universe: 001 Total population
Universe Population: 243,422,739

Figure 2.2 Indonesia total population in 2010.[8]

Age Group	Male Population	Pct	Female Population	Pct
Total	149,948,259	50.0	150,234,907	50.0
0- 4	8,372,275	2.8	7,998,331	2.7
5- 9	8,757,394	2.9	8,375,684	2.8
10-14	9,190,920	3.1	8,794,095	2.9
15-19	9,546,436	3.2	9,121,985	3.0
20-24	9,706,191	3.2	9,226,820	3.1
25-29	9,711,410	3.2	9,157,623	3.1
30-34	9,794,578	3.3	9,194,589	3.1
35-39	10,046,921	3.3	9,436,612	3.1
40-44	10,364,542	3.5	9,784,556	3.3
45-49	10,502,400	3.5	10,000,769	3.3
50-54	10,300,540	3.4	9,925,968	3.3
55-59	9,379,007	3.1	9,168,839	3.1
60-64	8,560,262	2.9	8,593,598	2.9
65-69	7,974,804	2.7	8,358,793	2.8
70-74	6,982,943	2.3	7,678,874	2.6
75-79	5,418,473	1.8	6,494,754	2.2
80-84	3,187,026	1.1	4,219,738	1.4
85+	2,152,137	0.7	4,703,279	1.6

Indonesia, 2050, Universe: 001 Total population
Universe Population: 300,183,166

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[7] Source: http://proximityone.com/future_of_indonesia.htm#:~:text=Future%20of%20Indonesia%3A%20Tr ends%20Projections%20Age%2DCohort%20Analysis&text=Indonesia%2C%20the%20world's% 20fourth%20most,to%20300.2%20million%20in%202050, 2020.

[8] Source: proximytone.com

Figure 2.3. Indonesia total population in 2050.[9]

Currently, Indonesia is the world's fourth most populous country (after China, India, and the USA). However, as birth rates are very high on the African continent (4.8 children per woman, whereas the global average is 2.5 children per woman), Nigeria is expected to surpass Indonesia by 2050 in terms of population size. In 2013, Indonesia's population numbered 249 million people in total, but this number is expected to jump to 366 million by 2050.[10]

Table 2.1 Most Populous Countries in 2013

Country	Population Size
1. China	1.361
2. India	1.277
3. USA	316
4. Indonesia	249
5. Brazil	196
6. Pakistan	191
7. Nigeria	175
8. Bangladesh	157
9. Russia	144
10. Japan	127

Notes: In million

Table 2.2 Most Populous Countries in 2050

Country	Population Size
1. India	1.652
2. China	1.314
3. Nigeria	444
4 USA	400
5. Indonesia	366
6 Pakistan	363
7. Brazil	227
8 Bangladesh	202
9. Kongo	182
10. Ethiopia	178

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[9] Source: proximytone.com
[10] Source: https://www.indonesia-investments.com/id/news/todays-headlines/indonesia-will-be-the-worlds-fifth-most-populous-country-by-2050/item1177. 2020

Notes: In million.[11]

Indonesia is honoured to be a member of the G20 established in 1999. Indonesia is the only representative country from Southeast Asia and based on several considerations (including population size and economic size) was selected as the representative. Indonesia has participated in regions such as the ASEAN Economic Community (AEC) or more integrated economies at the international level such as the World Trade Organization (WTO). Among other G20 members, Indonesia was the second, in terms of per capita GDP, to the poorest country, India (see Figure below). In terms of the size of economy, Indonesia is slightly larger than other developing countries such as Argentina, Saudi Arabia, and South Africa. Recently, Indonesia is becoming larger in terms of GDP size. It has a larger GDP than those of developing countries and even developed and richer countries such as Australia. However, among the G20 members, Indonesia remains the second poorest G20 member with a very low per capita income relative to the average value of the G20.
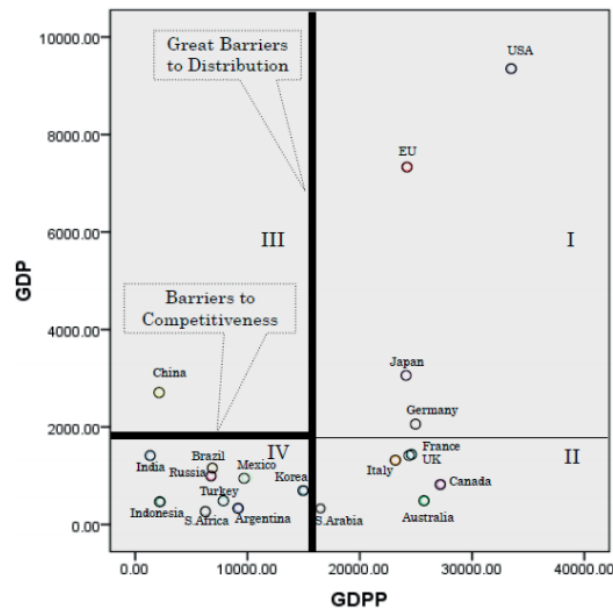
Figure 2.4 The Distribution of G20 Members by GDP, 1999

Source: Salim, 2010, p. 97

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[11] Source: https://www.indonesia-investments.com/id/news/todays-headlines/indonesia-will-be-the-worlds-fifth-most-populous-country-by-2050/item1177 .

Notes:

GDP: Gross Domestic Products in Purchasing Power Parity (PPP) term in billions and

GDPP: per capita GDP. Both are in international dollar.

The globalizing world recently shifted the average of GDP in Purchasing Power Parity (PPP) term from 1,857 billion dollar in 1999 to 3,134 billion dollar in 2009. Per capita GDP (GDPP) shifted from 15,803 dollar in 1999 to 23,039 dollar in 2009 (as shown in Figure 2). It means that within ten years of development in the world under liberalization and globalization just lifted the country like China and India to a bigger economy (with larger GDP, more than the average level).
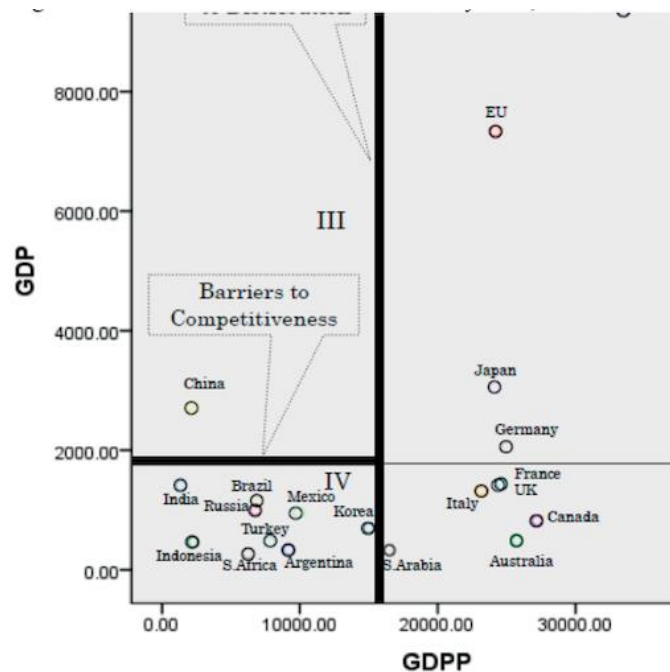
Figure 2.5 The Distribution of G20 Members by GDP, 2009

Source: Salim, 2010, p. 98

Notes:

GDP: Gross Domestic Products in Purchasing Power Parity (PPP) term in billions and

GDPP: per capita GDP. Both are in international dollar.

The position of Indonesia is strategic. Yet, this country still could not present its best strategic position in some negotiations due to the poor capability of the negotiators and/or improper preparation. The limited budget and uncoordinated voices seem to be the other barriers to negotiation. As one of several developing countries that is facing common economic problems, such as a limited national

budget, it is beneficial for Indonesia to coordinate and release the common voice together with other developing countries before delivering the messages to the G20 negotiation table, thereby ensuring a better bargaining position. Being a member of the G20 is a surprising moment. For the government to hold one seat at the G20 meetings is proof of a successful governmental job as well as its increasing influence in the world. In relation to the international political agenda, principally, Indonesia has set its policy on non-alignment, neutral but actively involving itself in international relations. As this is the backbone of the foreign policy of Indonesia, it sometimes has discouraged the country to take any risk and it tends to avoid conflicts. As one of the new economic powers in the world, the membership of Indonesia in the G20 is not only an honour but also a responsibility towards the international community. The Indonesian economy has played a global role and the existence of Indonesia has always been promoted in the world including the aspect of economic and political influences. Indonesia must use this opportunity to reap the benefits of being a member. As a member of the G20, Indonesia has better opportunities than non-member developing countries in solving the global economic and financial problems. Its relatively larger GDP and great size in population compared to other ASEAN members could be the most significant reason for the membership of Indonesia in the G20. Even though it has a larger number of members than the G8, the G20 still attracts the question of being an organization with exclusive members; and thus, faces questionability of its legitimacy from non-members. There are uncertainties regarding the criteria determining the eligibility of prospective G20-members—whether they should be based on the size of economy, per capita GDP, or other criteria (Patrick, 2010, p. 19). The increasing size of the Indonesian economy in terms of GDP and its active membership in many regional trading arrangements and other international institutions are the basic arguments that allow it to stand out in the international community. Within ten years, the economic size of Indonesia has increased from USD154.71 billion in 1999 to USD514.93 billion in 2009; an increase of 267.53%. Within the last ten years, based on macro-economic indicators, Indonesia has put up a good performance. The better performance of the Indonesian economy is related to economic growth, controllable inflation rate, better banking, and other

financial institution etc. However, this fast-growing economy has been burdened by foreign debts (government and private debts). During the 1997/1998 crisis, the burden of foreign debts was close to 100% over GDP (Salim, 2010, p. 99). Meanwhile, OECD in their newest report in March 2021, described that Growth of gross domestic product (GDP) in the G20 area slowed to 2.1% in the fourth quarter of 2020, down from the large rebound in the previous quarter (7.8%) that followed the unprecedented falls in the first half of the year due to COVID-19 containment measures. Among the G20 economies, India continued to record the highest growth (7.9%) in the fourth quarter, following a growth of 23.7% in the previous quarter. In most other economies, GDP growth, although lower than in the third quarter, remained positive: Mexico (3.3%), Brazil (3.2%), Australia (3.1%), Indonesia (2.9%), Japan and Arab Saudi (2.8% in both countries), China (2.6%), Canada (2.3%), Turkey (1.7%), South Africa (1.5%), Korea (1.2%), United Kingdom and United States (1.0% in both countries) and Germany (0.3%). On the other hand, GDP contracted in Italy and France and (by minus 1.9% and minus 1.4%, respectively), after strong rebounds in the previous quarter (15.9% and 18.5%, respectively). For 2020, GDP fell by (minus) 3.3% in the G20 area, with only China and Turkey recording growth (of 2.3% and 1.8%, respectively), while the United Kingdom experienced the largest fall (minus 9.9%).

Table 2.3 Quarterly GDP in volume terms for the G20 Percentage change on the previous quarter, seasonally adjusted data

	2019					2020					Cumulative growth over the last 4 quarters
	Q1	Q2	Q3	Q4	2019*	Q1	Q2	Q3	Q4	2020*	
G20	0.8	0.8	0.5	0.3	2.8	-3.2	-6.6	7.8	2.1	-3.3	-0.5
Argentina	0.2	-0.3	0.8	-1.0	-2.1	-4.1	-16.0	12.8	..	..	..
Australia	0.5	0.7	0.6	0.4	1.9	-0.3	-7.0	3.4	3.1	-2.5	-1.1
Brazil	0.9	0.4	-0.1	0.4	1.4	-2.1	-9.2	7.7	3.2	-4.1	-1.2
Canada	0.1	1.1	0.5	0.1	1.9	-1.9	-11.4	8.9	2.3	-5.4	-3.2
China	2.0	1.2	1.2	1.2	6.0	-9.7	11.6	3.0	2.6	2.3	6.5
France	0.5	0.3	0.2	-0.2	1.5	-5.9	-13.5	18.5	-1.4	-8.1	-4.9
Germany	0.6	-0.5	0.3	0.0	0.6	-2.0	-9.7	8.5	0.3	-4.9	-3.6
India	1.2	0.9	0.9	0.4	4.8	1.1	-25.9	23.7	7.9	-6.9	0.1
Indonesia	1.2	1.3	1.2	1.2	5.0	-0.7	-6.9	3.0	2.9	-2.1	-2.1
Italy	0.1	0.1	0.0	-0.4	0.3	-5.5	-13.0	15.9	-1.9	-8.9	-6.6
Japan	0.6	0.1	0.2	-1.8	0.3	-0.6	-8.3	5.3	2.8	-4.8	-1.3
Korea	-0.3	1.0	0.4	1.3	2.0	-1.3	-3.2	2.1	1.2	-1.0	-1.2
Mexico	0.3	0.0	0.0	-1.1	-0.1	-1.0	-16.8	12.4	3.3	-8.2	-4.5
Russian Federation	-0.5	2.4	-0.9	-0.7	1.3	-0.9	-3.2	1.5	..	..	..

Saudi Arabia	-0.9	0.1	-0.2	0.3	0.3	-1.3	-5.2	1.8	2.8	-4.1	-2.1
South Africa	-0.8	0.8	-0.2	-0.4	0.2	-0.4	-16.6	13.7	1.5	-7.0	-4.2
Turkey	1.7	2.1	0.4	2.0	0.9	0.1	-11.0	15.9	1.7	1.8	5.0
United Kingdom	0.6	0.1	0.5	0.0	1.4	-2.9	-19.0	16.1	1.0	-9.9	-7.8
United States	0.7	0.4	0.6	0.6	2.2	-1.3	-9.0	7.5	1.0	-9.9	-7.8
European Union	0.6	0.3	0.3	0.1	1.6	-3.3	-11.2	11.6	-0.5	-6.2	-4.6
of which: Euro area	0.5	0.2	0.2	0.1	1.3	-3.8	-11.6	12.5	-0.7	-6.6	-4.9
OECD-Total	0.6	0.4	0.4	0.2	1.6	-1.9	-10.4	9.3	0.9	-4.8	-3.1

Source: OECD, 2021, p. 2

2.2 Indonesian Education System

Indonesia, a country in Southeast Asia, is made up of more than 17,000 tropical and volcanic islands that span the equator between the Indian and Pacific oceans. The main regions of Indonesia include the islands of Java, Bali, and Sumatra, as well as large parts of Borneo, Sulawesi, Maluku, and Papua. Today, Indonesia is home to over three hundred ethnic groups with around five hundred languages and dialects. Eighty-seven percent of the population, or approximately 200 million people, are Muslims, making Indonesia the largest Muslim country in the world. In economy development, Indonesia is an emerging power that cannot be ignored. According to McKinsey Global Institute, Indonesia is the 16th largest economy in the world with huge potential Raised to seventh place by 2030 (Oberman et al. 2012). Indeed, Indonesian the current success can be attributed to the political stability and economy of the nation state elasticity. Indonesia is also one of the most dispersed countries in the world. The authority of the central government is limited to national defence and security issues. Religion, international affairs and law, fiscal and monetary policy, thereby giving Provinces have an important say in local governance. In addition, Indonesia has After the war, its macroeconomic policy has been significantly improved after the 1997-1998 Asian financial crisis. World Economic Forum ranks Indonesia 34th The macro-economy was stable in 2014, a sharp jump from the 87th place in 2007.

Such optimism about Indonesia's future is also reflected in the National Long-Term Survey A development plan for 2005-2025 that highlights the country's ambition to become the 12th largest economy in the world by 2025 and the 8th by

2045 however Indonesia's ambitions may be constrained by low labor productivity. In 2020, the workforce dominated by primary education graduate by 38,89%, only 12,33% have higher education certificate (9.63% have graduated from tertiary education and 2,70% have graduated from polytechnic). Productivity is further hampered by the large skill gap between workers skills acquired through formal education and skills needed in the workplace. In fact, Indonesia's labor productivity is lower than Malaysia, Thailand and the Philippines and China (World Bank, 2014). Therefore, Indonesia currently focuses on education that is oriented towards mastering skills to make it easier for graduates to be accepted by the industrial world. through Presidential Instruction no. 9 of 2016 concerning the revitalization of SMK, relevant ministries have decided to focus extensively on improving technical and vocational education and training (TVET) to narrow the skills gap that the industry needs.

Every nation has a national education system. The national education of each nation is based on its cultural soul and personality. The education system in Indonesia is structured based on the culture of the Indonesian nation and is based on Pancasila and the 1945 Constitution. Although the influence of Dutch colonialism in Indonesia has lasted three and a half centuries, the education system that was widely used was education during the Japanese occupation. Call it the education gap system in post-independence Indonesia. At the end of the Japanese occupation, the pattern of the gap system that was in effect was 6-3-3-4 (Supendi, 2016, p. 166). Once Indonesia became independent, it turned out that this system of separation was continued by applying 6 years for primary school (SD), 3 years for junior high school (SMP), 3 years for Senior high school (SMA), and continue to higher education level in vocational program which is diploma 1 for 1 year, diploma 2 for 2 years, diploma 3 for 3 years and diploma 4 for 4 years, And academic program for 4 years to 6 years for bachelor degree, 2 years to 3 years for master degree and 3 years to 5 years for doctoral degree. Of course, mentioning the colonial period does not show totality because there are too many differences that were developed by the country concerned after independence. After independence, the education system in Indonesia underwent a series of transformations from the school system (Assegaf, 2003, p. 67). This can be seen in the amendment to the law

on education, namely Law no. 4 of 1950 concerning the basics of education and teaching in schools for all of Indonesia and Law no. 20 of 2003 concerning the National Education System. Through this law, national education has its legal basis. However, national education as a system is not a standard thing. A system is a process that is constantly looking for and perfecting its form (Tilaar, 1999). Even so, education in Indonesia has so far not been able to produce graduates who can be relied on in creating jobs, even the quality of the graduates produced is still doubted.

The reform movement in 1998 demanded reforms in the education sector. The Rectors forum, which was born on November 7, 1998 in Bandung, also declared the need for cultural reform, through education reform. The Parliament (DPR-RI) together with the government fulfilled this demand for reform by passing Law no. 20 of 2003 concerning the National Education System (Sisdiknas) dated June 11, 2003 (Kholis, 2014, p. 72). In the 2003 SISDIKNAS Law, it is stated that national education functions to develop capabilities and shape the character and civilization of a nation with dignity to educate the nation's life, aiming at developing the potential of students to become human beings who believe and fear God Almighty, with noble character, healthy, knowledgeable, capable, creative, independent, and become democratic and responsible citizens. Education System in Indonesia is currently faced with various internal and external problems caused by various kinds of changes, such as technological changes, social changes and cultural changes that have an impact on various progress and developments in education. The progress and development of education is a factor in the success of a nation. Some indications can be seen from the progress of the western world such as America and Europe, which have always been a role model when talking about educational issues. This is known from various data which provide information about excellence in the field of education such as learning models, research results, graduate products and so on. Indonesia as a nation which is still in its position as a developing country is looking for forms of methods and efforts to become a developed country, especially in the field of education. And the education system in Indonesia refers to the National Education System which is an education system that will bring progress and development to the nation and respond to the challenges

of the ever-changing times as well as the vision and mission of the National Education System as stipulated in Law RI NO 20 of 2003 concerning the National Education System are as follows: "The realization of the education system as a strong and authoritative social institution to empower all Indonesian citizens to develop into qualified human beings so that they are able and proactive in responding to the challenges of the ever-changing times." and national education missions are: "Striving for the expansion and equal distribution of opportunities to obtain quality education for all the people (RI SISDKNAS Law)." Education as a System in Article 1 of the SISDIKNAS Law no. 20 of 2003 states that the National Education System is an integrated whole component of education to achieve national education goals. Based on the statement of this article, education is a system which is a totality of structures consisting of interrelated components and together towards the achievement of goals (Soetarno, 2004, p. 2). The components in national education include the environment, infrastructure, resources, and society. These components work together, are interrelated and support in achieving educational goals. Apart from these components education also includes other systemic aspects, namely: The implementation of the content education aspect is input (students) as an object in education, while the process / transformation is a machine that will print students as expected, and objectives are the results achieved or outputs. It should be noted that the process / transformation in work is influenced by various factors, such as facilities, time, environment, resources, educators and so on, where these factors determine the output. Therefore, an education system needs to adjust the environment, because the environment contains several obstacles to the operation of the system (for example: limited resources). For this reason, the education system is required by the environment to process educational resources effectively and efficiently. Thus it is clear that the meaning of education as a system is that all components in education (such as the environment, society, resources) can work together in achieving the goals of national education, which in its implementation can be seen from the system aspects, namely input-process-output and the final results of the outputs can provide feedback on the inputs and processes so that the final results of educational goals can be known (Munirah, 2015, p. 10).

Based on the explanation above, the education system in Indonesia can be described as in the following table:

Table 2.4 Indonesia Education System based on Act No. 20 of 2003

Age	Education Level	Formal Education Program			Non-Formal Education Program		Qualification
		Academic Program	Islamic school	Vocational Program	Academic Program	Vocational Program	
25	Tertiary Education	S3 (doctoral program)		Applied science doctoral degree			9
24		S2 (master degree)		Applied science master degree			8
23				Profession			7
22		S1 (bachelor degree)		D4 (Diploma four)		LKP (training and course institution)	6
21				D3 (Diploma three)			5
20				D2 (Diploma two)			4
19				D1 (Diploma one)			3
16	Secondary School	SMA (secondary school)	Madrasah Aliyah (MA)	SMK (secondary vocational school)	Paket-C (equivalence program package C)		2
13	Basic Education	SMP (lower secondary school)	Madrasah Tsanawiyah (MTs)		Paket-B (equivalence program package B)		1
7		SD (primary school)	Madrasah Ibtidaiyah (MI)		Paket-A (equivalence program package A)		
6	Pre-school	TK (kindergarten)	Bustanul Athfal (BA)				
5							
4			Raudlatul Athfal (RA)				
3					play group		
2							

Source: developed from Act No. 20 of 2003

The following is an explanation of the table above (developed from; Supendi, 2016, p. 167-171):

2.2.1 Pre-school Education

It is called pre-school because children between 2 years to 6 years of age who are meant to be educational participants are directed towards preparation and adaptation for the next education at the primary education level (SD). The method

and subject matter are learning by doing pattern, by increasing the number of games to increase children's creativity. That is why it is called Kindergarten (TK). Generally, this kindergarten consists of two levels, namely: first level (small kindergarten) at 4-5 years old and second level (big kindergarten) at 6 years old. However, not all parents strictly follow these provisions. Some of them send their children directly to the Second level (big kindergarten) for a year, then go to SD before the child is 7 years old. Generally, learning activities in kindergarten are simple, the subject matter revolves around the introduction of colors, objects, letters and numbers, the rest is given games and skills for children's creativity, such as cutting, folding, or coloring. The number of early childhood education schools in Indonesia is increasing from time to time, especially in the big cities of Java, Sumatra, Kalimantan, and Sulawesi. The increase in the number of schools is due to the Indonesian people's enthusiasm for providing early childhood education for their children, while the increase in new schools is led by private schools. Therefore, this situation needs to be dealt with more seriously by the government to provide the best service to students. The following table lists the number of early childhood education schools and students as of the 2018/2019 school year.

Table 2.5 Number and type of Early Childhood Education (ECE) Schools by Province

No.	Provinsi	TK	KB	TPA	SPS	Jumlah
	Province	*KG*	*PG*	*DCC*	*OECE*	*Total*
1	DKI Jakarta	2.176	458	10	1.762	4.406
2	Jawa Barat	8.834	12.914	155	6.400	28.303
3	Banten	2.251	3.197	28	640	6.116
4	Jaws Tengah	14.031	10.160	577	3.012	27.780
5	DI Yogyakarta	2.143	1.482	208	1.235	5.068
6	Jawa Timur	18.422	14.709	433	4.811	38.375
7	Aceh	2.353	2.139	146	163	5.001
a	Sumatera Utara	2.721	5.393	105	489	5.708
9	Sumatera Sr	2.390	1.922	140	563	5.015
10	Riau	2.284	2.122	147	135	4.688
11	Kepulauan Riau	679	476	32	127	1.314
12	Jambi	1.329	1.986	61	200	3.576

13	Sumatera Selatan	2.063	3.013	25	152	5.253
14	Kep. Bangka Belitung	371	459	56	70	956
15	Bengkulu	1.042	876	125	94	2.137
16	Lampung	2.35	2.709	59	334	6.037
17	Kalimantan Barat	808	1.796	41	80	2.725
la	Kalimantan Tengah	1.864	687	65	325	2.941
19	Kalimantan Selatan	2.448	1.316	179	89	4.032
20	Kalimantan Timur	1.369	1.189	75	140	2.773
21	Kalimantan Utara	177	396	20	11	594
22	Sulawesi Utara	1.689	803	22	187	2.701
23	Gorontalo	828	732	13	88	1.661
24	Sulawesi Tengah	2.001	1.186	18	165	3.370
25	Sulawesi Selatan	4.190	1.817	66	279	6.452
26	Sulawesi Barat	757	813	23	35	1.628
27	Sulawesi Tenggara	1.895	546	14	22	2.467
28	Maluku	694	748	3	148	1.593
29	Maluku Utara	622	532	3	53	1.210
30	Bali	1.574	802	91	53	2.520
31	Nusa Tenggara Barat	1.807	2.342	36	246	4.431
32	Nusa Tenggara Timur	1.339	3.113	21	329	5.002
33	Papua	653	535	12	173	1.378
34	Papua Barat	369	426	18	43	856
	Indonesia	**91.398**	**83.784**	**3.027**	**22.658**	**201.657**

Source: Data from Ministry of Education and Culture (MOEC), 2019, p. 2

Notes:

KG = Kindergarten

PG = Play Group

DCC = Day Care Center

OECE = Other Type of ECE Unit

Table 2.6 Number of Students in Early Childhood Education (ECE) Schools by
Province

No	Provinsi	TK	KB	TPA	SPS	Jumlah
.	Province	KG	PG	DCC	OECE	Total
1	DKI Jakarta	80.638	9.725	112	45.303	144.778
2	Jawa Barat	353.192	357.776	2.831	191.103	904.862
3	Banten	92.460	89.560	337	18.156	200.513
4	Jawa Tengah	592.993	270 .560	12.017	69.469	944.682
S	Di Yogyakarta	89.063	270.203	4.591	20.438	147.013
6	Jawa Timur	811.747	305.576	7.147	111.792	1.236.262
7	Aceh	94.918	38.337	1.996	2.503	137.754
8	Sumatera Utara	105.332	121 .346	1.127	10.177	237.982
9	Sumatera Barat	80.104	38.760	1.881	7.969	128.714
10	Riau	88.133	38.586	1.117	2.382	130.218
11	Kepulauan Riau	25.986	8.654	204	2.804	37.848
12	Jambi	44.112	43.002	743	3.573	92.230
13	Sumatera Selatan	80.712	79.371	293	3.730	164.106
14	Kep. Bangka Belitung	22.429	13.940	1.128	1.984	39.581
15	Bengkulu	30.902	14.634	1.216	1.608	48.360
16	Lampung	132.877	69.689	1.02	6.493	210.079
17	Kalimantan Barat	32.162	36.283	545	1.359	70.449
18	Kalimantan Tengah	64.468	9.231	771	2.938	77.408
19	Kalimantan Selatan	101.777	26.865	2.735	1.792	133.169
20	Kalimantan Timur	60.694	26.708	1.226	3.659	92.287
21	Kalimantan Utara	8.100	8.559	473	280	17.412
22	Sulawesi Utara	28.764	8.956	90	1.160	38.970
23	Gorontalo	27.916	17.232	21	1.519	46.688
24	Sulawesi Tengah	57.683	17.754	106	1.427	76.970
25	Sulawesi Selatan	163.885	37.639	679	3.648	205.851
26	Sulawesi Bart	23.286	18.065	73	353	41.777

27	Sulawesi Tenggara	69.127	12.929	107	322	82.525
22	Maluku	16.611	14.288	21	2.541	33.461
24	Maluku Utara	20.990	12.188	16	906	34.100
36	Bali	73.779	8.108	996	175	83.058
31	Nusa Tenggara Barat	89.398	72.934	548	6.124	169.004
32	Nusa Tenggara Timur	44.320	57.058	228	7.515	109.321
33	Papua	26.439	7.306	293	2.090	36.128
34	Papua Barat	10.288	4.850	53	461	15.652
	Indonesia	**3.655.385**	**1.929.021**	**46.841**	**537.753**	**6.169.002**

Source: Data from Ministry of Education and Culture (MOEC), 2019, p. 3

Notes:

KG = Kindergarten

PG = Play Group

DCC = Day Care Center

OECE = Other Type of ECE Unit

2.2.2 Basic Education

Basic education is a 9-year education consisting of a 6-year education program held at a primary school (SD) and 3 years at a lower secondary school (SMP). The basic education curriculum implements a semester system that divides the study time of one academic year into two parts of time, each of which is called odd semester and even semester. The basic education curriculum is structured to achieve basic education goals. The basic education curriculum is a set of plans and arrangements regarding the content and learning materials and methods used as guidelines for implementing teaching and learning activities at SD or Madrasah Ibtidaiyah (MI) and SMP or Madrasah Tsanawiyah (MTS).

The equivalent of SD is MI, while SMP is MTs. The difference is, SD and SMP are under the Ministry of Education and Culture (MOEC), while MI and MTs are under the Ministry of Religion (MOR). In addition, the composition of the religious curriculum is mostly in MI and MTS with a ratio of 70% general, 30%

religion, while those in SD and SMP only provide two hours of religious instruction a week. The learning hours in primary school are longer than in kindergarten. Normally students enter class at 07.00 and return home at 12.00. Even so, some primary schools, especially those under Islamic organizations such as Muhammadiyah and Nahdatul Ulama (NU), increase their study hours, both for extra-curricular activities and lessons that are characteristic of these Islamic mass organizations so that students can go home from school at 13.30. Some of the leading primary schools sometimes extend their study hours to the afternoon or commonly known as full days school. Here students enter from 07.00 and return at 16.00, while rest, prayer, lunch are included in the educational program of the institution.

The content of the basic education curriculum includes the subjects of Religious Education, Citizenship Education, Indonesian Language, Mathematics, Natural Sciences, Social Sciences, Crafts and Arts, Physical Education and Health, English, and Local Content. SD uses the classroom teacher system, except for the subjects of Religious Education and Physical Education and Health, while SMP uses the subject teacher system.

Table below described the number of Primary schools and lower secondary schools and its students in Indonesia.

Table 2.7 Number of Primary Schools (SD) and its students by Province

No.	Provinsi	Sekolah	Siswa
	Province	*Schools*	*Pupils*
1	Prov. D.K.I. Jakarta	2.528	835.354
2	Prov. Jawa Barat	19.718	4.530.794
3	Prov. Jawa Tengah	19.010	2.801.499
4	Prov. D.I. Yogyakarta	1.844	293.627
5	Prov Jawa Timur	19.285	2.788.847
6	Prov. Aceh	3.492	495.859
7	Prov. Sumatera Utara	9.775	1.678.075
8	Prov. Sumatera Barat	4.233	631.591
9	Prov. Riau	3.727	807.851
10	Prov. Jambi	2.446	385.092

11	Prov. Sumatera Selatan	4.685	926.957
12	Prov. Lampung	4.729	845.207
13	Prov. Kalimantan Barat	4.426	589.247
14	Prov. Kalimantan Tengah	2.643	287.786
15	Prov. Kalimantan Selatan	2.935	381.891
10	Prov. Kalimantan Timur	1.899	420.197
17	Prov. Sulawesi Utara	2.236	223.814
18	Prov. Sulawesi Tengah	2.907	323.301
19	Prov. Sulawesi Selatan	6.465	907.473
20	Prov. Sulawesi Tenggara	2.320	304.983
21	Prov. Maluku	1.791	219.566
22	Prov. Bali	2.452	399.605
23	Prov. Musa Tenggara Barat	3.223	514.421
24	Prov. Musa Tenggara Timur	5.147	726.212
25	Prov. Papua	2,586	442.845
26	Prov. Bengkulu	1.388	207.633
27	Prov. Maluku Utara	1.313	150.049
26	Prov. Banten	4.634	1.198.075
29	Prov. Kepulauan Bangka Belitung	816	166.330
30	Prov. Gorontalo	944	116.544
31	Prov. Kepulauan Riau	962	232.205
32	Prov. Papua Barat	1.071	136.044
33	Prov. Sulawesi Barat	1.329	154.304
34	Prov. Kalimantan Utara	478	80.133
Indonesia		**149.435**	**25.203.371**

Source: Data from http://statistik.data.kemdikbud.go.id/index.php/page/sd

Table 2.8 Number of Lower Secondary Schools (SMP) and its students by Province

No.	Provinsi	Sekolah	Siswa
	Province	*Schools*	*Pupils*
1	Prov. D.K.I. Jakarta	1.135	372.859
2	Prov. Jawa Barat	5.448	1.788.094
3	Prov. Jawa Tengah	3.357	1.186.578
4	Prov. D.I. Yogyakarta	443	129.904

5	Prov. Jawa Timur	4.784	1.239.934
6	Prov. Aceh	1.171	202.248
7	Prov. Sumatera Mara	2.625	666.935
8	Prov. Sumatera Barat	827	214.590
9	Prov. Riau	1.196	262.545
10	Prov. Jambi	679	126.227
11	Prov. Sumatera Selatan	1.361	355.000
12	Prov. Lampung	1.381	321.069
13	Prov. Kalimantan Barat	1.323	235.550
14	Prov. Kalimantan Tengah	836	110.406
15	Prov. Kalimantan Selatan	614	115.179
16	Prov. Kalimantan Timur	657	160.226
17	Prov. Sulawesi Utara	724	115.520
18	Prov. Sulawesi Tengah	847	129.423
19	Prov. Sulawesi Selatan	1.680	371.100
20	Prov. Sulawesi Tenggara	765	130.355
21	Prov. Maluku	658	97.550
22	Prov. Bali	422	190.019
23	Prov. Nusa Tenggara Barat	958	175.307
24	Prov. Nusa Tenggara Timur	1.741	354.052
26	Prov. Papua	709	131.812
26	Prov. Bengkulu	427	89.360
27	Prov. Maluku Libra	493	63.206
28	Prov. Banten	1.501	430.903
29	Prov. Kepulauan Bangka Belitung	215	60.514
30	Prov. Gorontalo	338	49.623
31	Prov. Kepulauan Riau	381	92.970
32	Prov. Papua Barat	310	50.109
33	Prov. Sulawesi Barat	373	60.341
34	Prov. Kalimantan Utara	180	32.504
Indonesia		**40.559**	**10.112.022**

Source: Data from http://statistik.data.kemdikbud.go.id/index.php/page/smp

2.2.3 Secondary Education: General High School (SMA) and Secondary vocational School (SMK)

Secondary education includes Secondary School (SMA), Secondary Vocational School (SMK), Madrasah Aliyah (MA). The aim of secondary education is to increase students' knowledge in continuing education at a higher level and develop themselves in line with the development of science, technology, and arts and to increase the ability of students as members of society to have reciprocal relationships with the social, cultural, and natural surroundings. The course programs in SMA and SMK are broader than basic education. The general teaching program includes study materials and subjects compiled in the subjects of Religious Education, Citizenship Education, Indonesian Language and Literature, National History and General History, Natural Sciences (Physics, Biology, and Chemistry), Social Sciences (Economics, Sociology). , and Geography), and Art Education. Since the 1994 curriculum, the teaching program at the secondary education level has been organized into a special teaching program covering three majors, namely the Language, Natural Sciences (IPA), and Social Sciences (IPS) programs. This Special Teaching Program is held in class II and is chosen by students according to their abilities and interests. This program is intended to prepare students to continue their education at the tertiary education level in the field of academic education or professional education and to prepare students directly or indirectly to be ready to enter the workforce.

The high school curriculum and its equivalent apply a semester system that divides the study time of one academic year into two parts of time, each of which is called odd semester and even semester, while the learning system uses a subject teacher system.

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                    ┌─────────────────────┐
                    │  Secondary Education │
                    └─────────────────────┘
                   ┌───────────┴───────────┐
        ┌────────────────────┐   ┌────────────────────┐
        │ General High School│   │ Secondary Vocational│
        │       (SMA)        │   │    School (SMK)    │
        └────────────────────┘   └────────────────────┘
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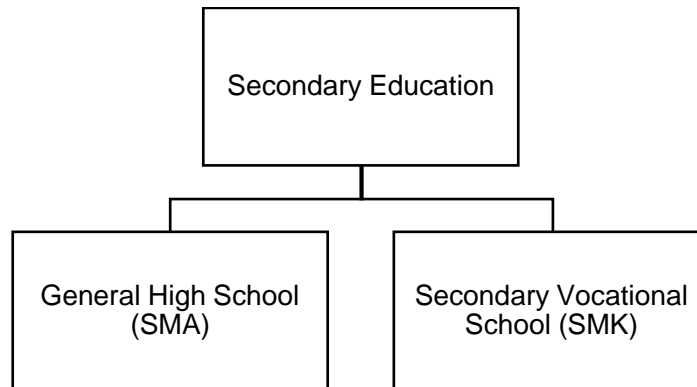
Figure 2.6 Secondary Education Pathways

Source: Developed by author, 2020

These two secondary education pathways are prepared for the Indonesian people. The purpose is to enable them to become people with knowledge, ability, and attitude according to the characteristics of the country, so as to enter the world of work or become responsible members of society. Both approaches have their own characteristics according to the educational goals, that is, SMA makes students have good academic knowledge and prepares to enter the academic world of higher education level, while SMK makes students equipped with knowledge, skills and working attitude to enter the world's work in the various sectors of the industry. The figure below illustrates the number of schools and students in secondary schools in the 2019/2020 school year.

Table 2.9 Number of General High School (SMA) and its students by Province

No.	*Provinsi*	*Sekolah*	*S i s w a*
	Province	Schools	Pupils
1	Prov. D.K.I. Jakarta	502	171.640
2	Prov. Jawa Barat	1.584	671.077
3	Prov. Jawa Tengah	858	402.804
4	Prov. D.I. Yogyakarta	165	55.262
5	Prov. Jawa Timur	1.524	535.612
6	Prov. Aceh	516	137.439
7	Prov. Sumatera Utara	1.064	368.853

8	Prov. Sumatera Barat	322	145.361
9	Prov. Riau	440	151.382
10	Prov. Jambi	223	75.391
11	Prov. Sumatera Selatan	594	204.592
12	Prov. Lampung	484	152.625
13	Prov. Kalimantan Barat	418	122.345
14	Prow. Kalimantan Tengah	239	56.627
15	Prov. Kalimantan Selatan	186	65.819
16	Prov. Kalimantan Timur	215	72.301
17	Prov. Sulawesi Utara	225	59.400
18	Prov. Sulawesi Tengah	211	71.724
19	Prov. Sulawesi Selatan	582	234.105
20	Prov. Sulawesi Tenggara	286	89.992
21	Prov. Maluku	275	69.739
22	Prov. Bali	159	86.698
23	Prov. Nusa Tenggara Barat	313	103.685
24	Prov. Nusa Tenggara Timur	509	181.128
25	Prov. Papua	225	61.786
26	Prov. Bengkulu	136	48.603
27	Prov. Maluku Utara	193	38.227
28	Prov. Banten	529	182.941
29	Prov. Kepulauan Bangka Belitung	67	26.215
30	Prov. Gorontalo	61	27.208
31	Prov. Kepulauan Riau	125	41.559
32	Prov. Papua Barat	118	26.471
33	Prov. Sulawesi Barat	88	28.846
34	Prov. Kalimantan Utara	59	16.188
	Indonesia	**13.495**	**4.783.645**

Source: Data from http://statistik.data.kemdikbud.go.id/index.php/page/sma

Table 2.10 Number of Secondary Vocational School (SMK) and its students by
Province

No.	*Provinsi*	**Sekolah**	**S i s w a**
	Province	Schools	Pupils
1	Prov. DKI Jakarta	589	227.952
2	Prov. Jawa Barat	2.943	1.135.667
3	Prov. Jawa Tengah	1.588	799.130
4	Prov. DJ, Yogyakarta	220	90.390
5	Prov. Jawa Timur	2.118	781.672
6	Prov. Aceh	217	56.404
7	Prov. Sumatera Utara	1,000	318.356
8	Prov. Sumatera Barat	216	93.423
9	Prov. Riau	299	104.194
10	Prov. Jambi	178	54.477
11	Prov. Sumatera Selatan	305	123.821
12	Prov. Lampung	482	150.682
13	Prov. Kalimantan Barat	223	75.603
14	Prov. Kalimantan Tengah	137	36.601
15	Prov. Kalimantan Selatan	125	60.735
16	Prov. Kalimantan Timur	222	80.428
17	Prov. Sulawesi Utara	187	53.096
18	Prov. Sulawesi Tengah	187	47.449
19	Prov. Sulawesi Selatan	441	140.146
20	Prov. Sulawesi Tenggara	162	35.822
21	Prov. Maluku	113	23.164
22	Prov. Bali	172	100.461
2,3	Prov. Nusa Tenggara Barat	325	80.032
24	Prov. Nusa Tenggara Timur	292	95.272
25	Prov. Papua	138	36.154
26	Prov. Bengkulu	104	31.062
27	Prov. Maluku Utara	139	18.789
28	Prov. Banter'	731	265.367
29	Prov. Kepulauan Bangka Belitung	58	25.883
30	Prov. Gorontalo	57	19.861

31	Pray. Kepulauan Riau	113	32.441
32	Prov. Papua Barat	54	15.375
33	Prov. Sulawesi Barat	137	29.487
34	Prov. Kalimantan Utara	29	9.753
Indonesia		**14.301**	**5.249.149**

Source: http://statistik.data.kemdikbud.go.id/index.php/page/smk

2.2.4 Tertiary Education

After a student who has completed studies at the high school level or the equivalent, if he intends to continue his education, he can choose any polytechnic, college, or university in Indonesia. In contrast with high schools, universities apply a semester credit system (SKS). In college/university, if a student can reach the targeted number of credits and can finished it within a certain time according to the programmed plan, that student can complete undergraduate higher education (S1) within 4 years. However, if you are unable to because you are repeating many courses with low grades or due to academic leave, the time taken to graduate as a bachelor can be more than 4 years. If he succeeds in graduation and intends to continue his further studies, there are still two stages in higher education that he can take, namely the S.2 or Masters level which normally takes 2 years and the S.3 or Doctorate level which is effectively taken for 2 years, while the rest for research. If all these stages of higher education are taken, a Doctorate degree is awarded for the chosen field. As in many other countries, Indonesia is also known for the existence of public universities that are managed directly by the government and private universities. In reality, many Indonesian students register at State Universities (PTN) first, then assign them to private universities (PTS). The impression that public schools and PTNs are superior and legitimate and are easier to find work is still inherent and widely believed by the community. In fact, after the National Accreditation Board (BAN) regulations for tertiary institutions were enacted with accredited and non-accredited status, actually PTN and PTS were treated the same. In fact, it could be that private universities get better scores than PTNs. Higher education prepares its participants for society, while success in life is influenced by many factors. Higher education is expected to function as an agent of change for

the life pattern of modern society. In accordance with the Tri Darma (mission) of Higher Education which includes education, research and service, education is carried out in the form of lectures in classrooms, research or research is carried out mainly by final semester students before graduation (in the form of writing a thesis, thesis, or dissertation), while service is carried out in the form of Student Work Lecture (KKN), or if at a teacher training university in the form of Field Experience Practice (PPL).

2.2.5 Non-formal Education Program

In its implementation, some of the Indonesian people cannot take formal education as expected by the government with various background problems, therefore the government through Act no. 20 of 2003 also mandates that the provision of non-formal education is recognized as equivalent to a diploma from formal education. There are many programs in non-formal education in Indonesia to provide educational services to the entire community, but programs that are equivalent to academic programs in formal education are the Package A, B and C equivalency programs organized by the Learning Activity Center (SKB), Community Learning Center (PKBM), or other similar units and the vocational training program at the Course and Training Institute (LKP). The following is an explanation of these programs:

2.2.5.1 Equivalency Examination Program

Equivalency examination program is a non-formal education that includes Packages A (primary school level), B (lower secondary school level), C (secondary school level), programs with an emphasis on knowledge acquisition, functional skills and the development of students' professional attitudes and personalities.

Non-formal education itself according to the Laws and Regulations of Republic of Indonesia Government concerning education states that non-formal education is a path of education outside of formal education which is implemented in a structured and tiered manner. Non-formal education functions to develop students with emphasis, knowledge, and skills as well as the development of

professional personality attitudes. So that equivalency program is one of the education units in the non-formal education pathway which includes study groups both the Package A Program, the Package B Program, and the Package C Program which can be held through the Learning Activity Center (SKB), Community Learning Center (PKBM), or other similar units.

Equivalency program with the slogan "Reaching the unreachable" seeks to provide educational services for citizens who do not have the opportunity to receive formal education for various reasons. There are school-age children who drop out of school due to financial constraints, there are also working adults, and various other backgrounds. In equality education, apart from being given scientific material, it is also given material on life skills. It is hoped that with these life skills, students will be able to be independent and be able to create business fields for themselves. The life skills given depend on the characteristics of the place where the learning activity takes place. These life skills can be in the form of workshops, handicrafts, animal husbandry or agriculture.

The legality of pursuing packages A, B, and C has been guaranteed by the government in Act no. 20 of 2003 concerning the national education system which states that equality education is a non-formal education program that provides general education equivalent to SD / MI, SMP / MTs, and SMA / MA which includes the program package A, package B, and package C. This is also reinforced in article 17 paragraph 2-3 which states that education which is equivalent to SD / MI is a program such as package A and that which is equivalent to SMP / MTs is a package B program while education which is equivalent to SMA / MA is a program such as package C One of the legal foundations for the pursuit of packages A, B, and C is government regulation number 73 of 1991 concerning outside school education and a joint agreement between the Director General of Outside School and Youth Education, Ministry of National Education of the Republic of Indonesia and the Director General of Islamic Religious Institutions at the Ministry of Religion Republic of Indonesia number. 19 / E.MS / 2004 and number. DJ.II / 166/04 concerning the implementation of equality education.

Equivalence education is a non-formal education pathway with the same graduate competency standards as formal schools in Indonesia, but the content,

context, methodology, and approaches to achieving the competency standards of these graduates provide more applied, thematic, inductive concepts related to environmental problems and train skills. Live work-oriented or self-employed. This kind of Educational opportunities must be provided equally for all community, on the other hand, it is required to improve the quality of education.[12] The competency standards of equivalent education graduates are given special note. Special notes include:

(1) possessing basic skills to meet daily needs (for Package A).

(2) possessing skills to meet the demands of the world of work (for Package B).

(3) ownership of entrepreneurial skills for Package C.

2.2.5.2 Training and Course Program

Course and Training Institutions are a form of Non-Formal Education units organized for people who need knowledge, skills, life skills and attitudes to develop themselves, develop professions, work, work independently, and or continue their education to a higher level. Course and training institutions are units of non-formal education which are organized for members of the community who need provisions to develop themselves, work for a living, and or continue to a higher level or level of education. While the course and training program is a type of skill that is carried out by non-formal education units, in this case the course and training institution (LKP), in each course and training institution may consist of one or more courses and training programs.

LKP is classified into 4 categories, namely:

1) International standard LKP,

2) LKP with National Education Standards (SNP),

3) LKP with Minimum Service Standards (SPM), and

4) Pioneer LKP.

An international standard LKP is a LKP that has met the requirements as a National Classified LKP and is enriched with characteristics that refer to the advantages required to have competitiveness at the international level. Thus, an

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[12] Source: https://pauddikmassumbar.kemdikbud.go.id/artikel/52/apa-itu-pendidikan-kesetaraan .

internationally classified LKP is a LKP that has met and implemented the full requirements of a nationally classified LKP which includes content standards, process standards, graduate competency standards, standards for educators and educational staff, standards for infrastructure, management standards, financing standards, and assessment standards.

LKP in the SNP category is LKP that has met the requirements as LKP with the minimum service classification and is enriched with characteristics that refer to the advantages required to have competitiveness at the national level.

Thus, a nationally classified LKP is a LKP that has met and implemented the full requirements of a LKP with a minimum service classification which includes content standards, process standards, graduate competency standards, teachers and education staff standards, infrastructure standards, management standards, financing standards, and assessment standards. .

LKP in the SPM category is LKP that has met the minimum requirements as an LKP, namely:

1) Educational content, including competency-based curriculum structure oriented to local excellence, and teaching materials in the form of books / teaching material modules.

2) Educators and Education Personnel, including: the number, qualifications and competence of each educator and educational staff in accordance with their respective fields.

3) Facilities and infrastructure, including the availability of office space, theoretical study room, practice room, teaching and learning facilities and learning media, with the appropriate size, type, and number.

4) Financing, including operational costs and personal costs to support the implementation of educational programs.

5) Management includes the organizational structure of the institution and a clear and directed job description to facilitate the running of activities in achieving goals; and

6) The educational process, including syllabus and lesson plans (RPP).

Pioneer LKP category is LKP that has met the minimum requirements as an institution to organize learning activities, has just initiated the implementation of

education and training at the beginner level, or LKP that has not met the minimum service classification. Some of the essential features of the pioneer LKP are:

(1) having a commitment to make a positive contribution in providing non-formal education services for people in need.

(2) implementing a simple, active, and fun learning process.

(3) maximizing the use of available infrastructure; (4) using limited and efficient financing; and

(4) have educators / instructors.

2.3 TVET System in Indonesia

The technical and vocational education and training (TVET) system in Indonesia has long been one of the leading programs for producing competent human resources in accordance with industry demands. currently technical and vocational education and training (TVET) in Indonesia is the responsibility of 3 ministries, namely;

(1) The Ministry of Education and Culture (MOEC) with its education units in the form of secondary vocational school (SMK), polytechnic, community academy (AKN), university with vocational program, and training and course institution (LKP).

(2) The Ministry of Religion Affairs (MORA) with its education unit in the form of secondary Islamic vocational school (MAK).

(3) The Ministry of Manpower and Transmigration (MOMT) with its training units in the form of public Job training center (BLK) and private job training institution (LPK).

All programs offered by these vocational education and training units refer to the Indonesian National Competency Standards (SKKNI) and refer to the Indonesian National Qualifications Framework (KKNI).

The table below shows the number of TVET institutions from 3 ministries serving vocational programs :

Table 2.11 Indonesia TVET Units

TVET institution	PUBLIC	PRIVATE	TOTAL	PROGRAM
SMK	3612	10672	14284	Secondary school
MAK	2	232	234	Secondary school
LKP		17306	17306	Short Training program
COMMUNITY ACADEMY	4	14	18	See Table 2.12
Academy		973		See Table 2.12
POLYTECHNIC	43	156	199	See Table 2.12
Institute	12	79	91	See Table 2.12
School of Higher Learning		1449		See Table 2.12
UNIVERSITY	112	2137	2249	See Table 2.12
BLK	329	0	329	Job preparation and advanced program
LPK	0	1384	1384	Job preparation and advanced program
BLK community	0	417	417	Short Training program
		TOTAL	36511	

Source: Data from the MoMT, MoEC, and MoRA, calculation by Author

- SMK = Secondary Vocational School
- MAK = Islamic Secondary Vocational School
- BLK = Job Training Center
- LPK = Job Training Center Institution

Table 2.12 Summary of Program Offer in Tertiary Education

Form of Tertiary Education Institutions	Programs Offered										
	Academic			Vocational							
	S1	S2	S3	D1	D2	D3	D4	Voc. Master	Voc. Doctorate	PR	SP
Community Academies	-	-	-	√	√			-	-	-	-
Academies	-	-	-	√	√	√		-	-	-	-
Polytechnics	-	-	-	√	√	√	√	√	√	√	√
Advanced Schools	√	√	√	-	-	√	√	√	√	√	√
Institute	√	√	√	-	-	√	√	√	√	√	√
Universities	√	√	√	-	-	√	√	√	√	√	√

Source: Data from Directorate of Higher Education. Developed by author

PR = Profession; S1 = Bachelor ; S2 = Master; S3 = Doctoral

SP = Specialist; D1 = Diploma 1; D2 = Diploma 2; D3 = Diploma 3;

D4 = Diploma 4 (Equivalence with Bachelor)

Besides MoEC, MoRA and MoMT, line ministries also have their direct TVET institutions and / or have developed cooperation network with private VETs as well (see Table 2.13).

Table 2.13 Ministries TVET Institution

No.	Ministry/Agencies	Polytechnics	SMKs	Vocational Training Centers
1	Ministry of Industry	7	9	7
2	Ministry of Agriculture	7	3	10
3	Ministry of Tourism	6	n/a	n/a
4	Ministry of Energy and Mineral Resources	5	n/a	1
5	Ministry of Public Works and Housing	13	n/a	12
6	Ministry of Communication and Informatics	1	n/a	1

No.	Ministry/Agencies	Polytechnics	SMKs	Vocational Training Centers
7	Ministry of Transportation	13	n/a	18
8	Ministry of Social Affairs		n/a	9
9	Ministry of Manpower	1	n/a	3778
10	Ministry of Education and Culture	1,350	14,046	16,935
11	Ministry of Trade	n/a	n/a	2
12	Ministry of Cooperatives and SME	n/a	n/a	1
13	Ministry of Health	38	n/a	35
14	Geospatial Information Agency	n/a	n/a	1

Source: Data Developed by Author

2.3.1 TVET Policy in Indonesia

Vocational education in Indonesia has several laws and regulations that form the basis for its implementation. Judging from its management, the legal basis is divided into 2 types, namely (1) the legal basis for implementing vocational education (2) the legal basis for implementing job training and employment. below is a further explanation of the legal basis.

2.3.1.1 Main Regulation on vocational education

The main policies regarding vocational education in Indonesia, among others, are contained in Act no. 20 of 2003 concerning the National Education System and Government Regulation no. 19 of 2005. According to Act no. 20 of 2003, vocational education has entered the National Education System by law, namely education that is included in the formal education pathway (Article 18, Paragraph 2), which states that secondary education consists of general education and vocational education.

Furthermore, in Article 18, Paragraph 3 states, "secondary education is in the form of Senior High School (SMA), Madrasah Aliyah (MA), Vocational High

School (SMK), and Vocational Madrasah Aliyah (MAK), or other equivalent forms". Meanwhile in tertiary education implementation based on government regulation of the republic of Indonesia number 4-year 2014 concerning the management and administration of higher education. However, because the formula is too short and in a small portion, the position of vocational education is still not strong and unclear. As described earlier, as a comparison, in the United States the vocational education policy has long been formulated in detail in a separate law.

Meanwhile, according to Government Regulation Number 19 of 2005 concerning National Education Standards Article 2 Paragraph (1), the scope of national education standards includes eight standards: content standards, process standards, graduate competency standards, educator and educational staff standards, facilities and infrastructure standards, standards management, financing standards, and education assessment standards. Of the eight standards that explicitly refer to vocational education, among others, the standard of contention, competency standards of graduates, and standards of educational assessment.

Regarding content standards, Article 7 Paragraph (6) of the PP states that "the group of science and technology subjects at SMK / MAK, or other equivalent forms is carried out through language, mathematics, natural science, social science, content and / or activities. skills, vocational, information and communication technology, and relevant local content ".

Competency standards for vocational education graduates are stated in Article 26 Paragraph (3), namely "the competency standards of graduates in vocational secondary education units aim to improve intelligence, knowledge, personality, noble character, and skills to live independently and follow further education in accordance with their vocations".

The description of educational assessment standards for vocational high schools consists of two things: assessment of learning outcomes and national examinations. The assessment of learning outcomes for science and technology subject groups is measured through tests, assignments, and / or other forms in accordance with the characteristics of the material being assessed (Article 64 Paragraph 4). While the national exams for vocational high schools, the material is regulated as the formulation in Article 70 Paragraph (7) follows: "In SMK / MAK

or other equivalent forms, the National Examination includes Indonesian, English, Mathematics, and vocational subjects which become a hallmark of education programs'.[13]

2.3.1.2 Main Regulations on Training and Employment

The foundation of the TVET system in Indonesia is in Act No. 13 of 2003 concerning human resources (Manpower) and Act No. 20 of 2003 on National Education System, complemented by regulations on the National Professional Certification Authority (Government Regulation 23 of 2004 updated by Government Regulation No. 10 of 2018); the National System of Skill Training (Government Regulation Number 31 of 2006); the Indonesian National Qualification Framework (Presidential Regulation Number 8 of 2012) and its guidelines for implementation (Regulation of the Minister of Manpower Number 21 of 2014 and the Regulation of the Minister of Education and Culture No. 13 of 2013); and the Standardization of the National Competency System for Work (Regulation of the Minister of Manpower Number 2 of 2016) and its procedures for implementation (Regulation of the Minister of Manpower Number 3 of 2016). These laws and regulations are complemented by the Presidential Instruction No. 9/2016 on the Revitalization of SMK. As established by the regulations, the National Work Training System or Sislatkernas (Sistem Pelatihan Kerja Nasional) links the various components of skill training to achieve the objective of a skilled labor force that can contribute to the Indonesian economic growth. The main components of Sislatkernas are the following.

a. The Indonesian National Competency Standards (SKKNI) and the Indonesian National Qualifications Framework (KKNI). Through this component, Sislatkernas recognizes the importance of clear definitions of competency frameworks per occupation and their packaging into the qualification framework.

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[13] Source: https://fatkhan.web.id/peraturan-perundang-undangan-pendidikan-kejuruan-di-indonesia/

b. The National Skill Training based on SKKNI and KKNI. Through this component, Sislatkernas recognizes that the competency standards should guide the provision of training. It is important to mention that the Presidential Regulation on Revitalization of SMKs expanded this component to the Vocational Education System.

c. The National Competency Certification. Through this component, Sislatkernas emphasizes that the certification must be based on the identified competency standards (The World Bank, 2020).
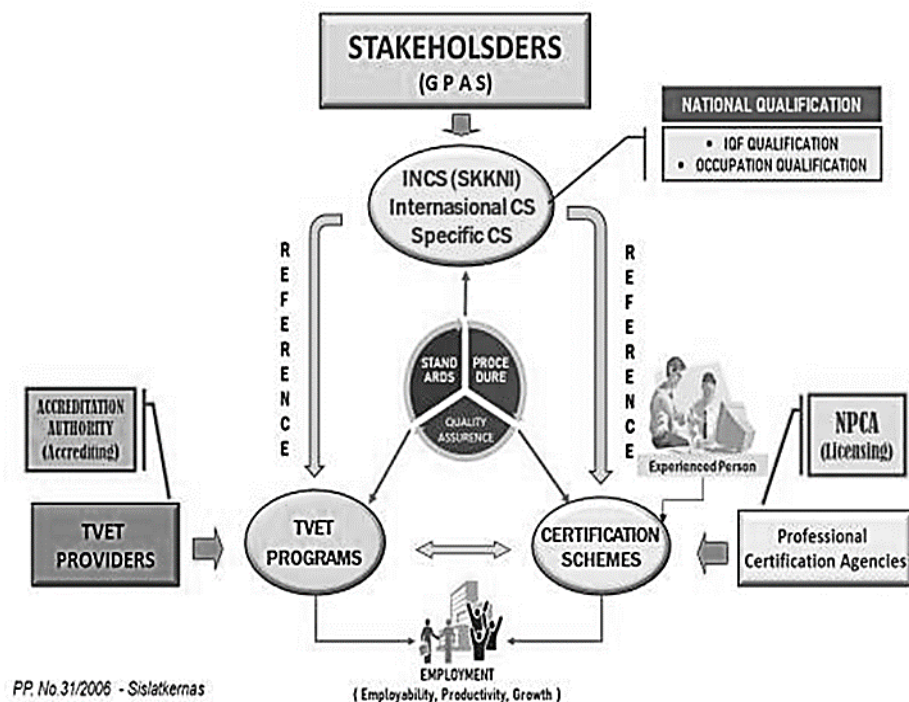
Figure 2.7 The Dynamic and Relevance of Sislatkernas

Source: World Bank, 2020

Furthermore, Figure 1 illustrates how Manpower Law No.13/2003 mandates labor quality through development of work competency as demanded by the industries. The work competency is acquired by training should refer to work competency standards (SKKNI) and Indonesia Qualification Framework (KKNI) and followed by competency assessment and certification. To implement this, the Government had issued two regulations - Government Regulation No.23 of 2004 to govern process of competency certification including establishment of the Badan

Nasional Sertifikasi Profesi or National Professional Certification Authority (BNSP) and the Government Regulation No.31 of 2006 to govern process of competency-based training by establishing a national skill training system (Sislatkernas). The Sislatkernas describes an integrated approach of skill training consisting of three pillars: competency standard (SKKNI); competency standard-based training and education; and competency certification. In addition, the Sislatkernas also determine level of competency acquisition grouped into nine level of competency qualification. Description of this qualification is stated by the Presidential Regulation (Perpres) No.8/2012 on Indonesia Qualification Framework (KKNI). In addition, the KKNI could be used for equalization of competency qualification of education and training outputs (World Bank, 2020).

2.3.2 Assessment and Certification System

Competency-based Human Resources (HR) development has been implemented since the issuance of Act no. 13 of 2003. The concept of competency-based HR development rests on three main pillars, namely the development of the Indonesia National Competency Standards (SKKNI), the development of SKKNI-based education and training and the development of an independent and reliable competency certification system. In connection with the new paradigm, a National Professional Certification Agency (BNSP) was formed through Government Regulation (PP) No. 23 of 2004. BNSP is an independent institution in charge of carrying out work competency certification and is responsible to the President of the Republic of Indonesia [PP No.23, 2004] (Sunarya et. al 2018, p. 70). According to Sunarya, et. al that with Given the wide scope of professions that need to be certified, in carrying out their duties, BNSP can grant licenses to Professional Certification Agencies (LSPs) as an extension of BNSP [PP No.23, 2004]. The license is granted after BNSP conducts a conformity assessment of the LSP, in accordance with the provisions of the BNSP. BNSP recognizes three types of Professional Certification Agencies, namely:

1. First Party Professional Certification Agencies (LSP P1) are established either by companies to certify their employees, or by SMKs and tertiary vocational institutions to certify their students' learning outcomes.

2. Second Party Professional Certification Agencies (LSP P2) are established by companies to assess and certify suppliers in their production chain.

3. Third Party Professional Certification Agencies (LSP P3) are established by industry or professional associations. Certification for competencies obtained in public.

LSP as the executor of BNSP's duties, carries out competency certification activities referring to the guidelines set by BNSP. Competency Certification is the process of granting competency certificates which are carried out systematically and objectively through a competency exam which refers to the certification scheme that has been made by LSP and approved by BNSP. The competency certification process organized by the LSP consists of registering potential participants to issuing competency certificates. The implementation of the competency exam is carried out and assessed by an assessor. The evaluation results from the competency exam then become the basis for determining the participant's eligibility (assessment) decision to obtain a certificate. The certification program has been regulated in Government Regulation (PP) No. 23 of 2004 concerning the National Agency for Professional Certification. In Article 1 of the PP it is explained that what is meant by work competency certification is the process of granting competency certificates which are carried out systematically and objectively through a competency test that refers to the Indonesian national and / or international work competency standards. Furthermore, in point 2 it is also explained that the Indonesian National Work Competency Standard is a formulation of work ability which includes aspects of knowledge, skills and / or expertise as well as work attitudes relevant to the implementation of duties and job requirements which are determined in accordance with the provisions of laws and regulations applies. Certification is a series of activities for the issuance of a certificate on the competence of a person or product or service, or the process of an institution's activities that are in accordance with and / or meet the required standards. Certification is the process of granting certificates that are carried out systematically and objectively through an assessment of Indonesia's national and / or international performance (Government Regulation, 2004). Certification can be divided into three, namely:

1. Certification of professional competence is carried out by a Professional Certification Agency and is valid if it is still competent. This certificate is valid for the most recent competence (current competence).

2. Certification to obtain professional status is carried out by professional organizations, also known as professional license / registration. Sometimes this certification is issued after the person concerned has a professional competency certificate.

3. A training certificate provided by a training institution, called a certificate of attainment, is valid forever.
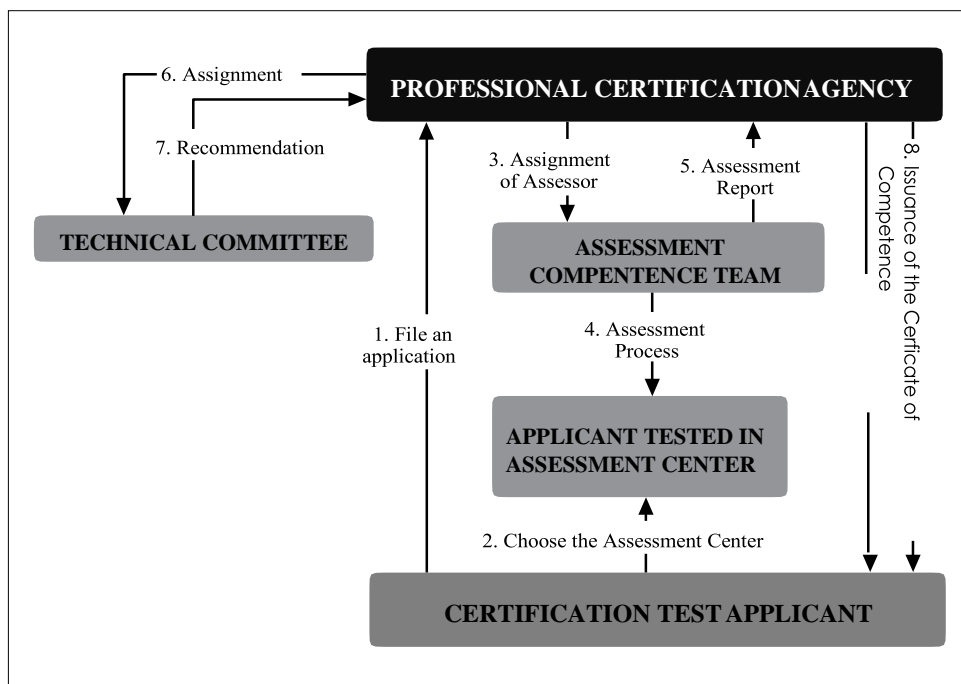
Figure 2.8 Assessment and Certification Scheme

Source: Lee Kwan Yew School of Public Policy, 2019, p. 27.

2.4 TVET Teacher Training in Indonesia

2.4.1 Pre-service TVET Teacher Training

2.4.1.1 Policy of Pre-service TVET Teacher Training

Indonesia's national education system is stipulated by Republic of Indonesia Act Number 20 of 2003 concerning the National Education System. The national education system regulates all components of education that must be implemented by stakeholders. In chapter VI, the law has regulated levels, pathways, and types of education. The education pathway includes formal, nonformal, and informal education channels. The education level consists of primary education, secondary education, and higher education. This type of education includes general, vocational, academic, professional, vocational, religious, and specialized education. Following up on the National Education System Law, many other laws and ministerial regulations support the implementation of the national education system. Supporting rules regarding the process of education, teachers and higher education include official rules on National Education Standards (Act No. 19 of 2005 and Government Regulation No. 32 of 2013), several ministerial regulations regarding components of national education standards, Act No. 14 of 2005 concerning Teachers and Lecturers, National Ministry Education Regulation No. 16 of 2007 concerning the qualifications and competency standards of teachers, and Act No. 12 of 2012 concerning higher education. Some of these laws and regulations guide the implementation of education at all levels of education. However, some are still not fully implemented, for example, about teachers and lecturers and higher education. Act No. 12 of 2012 is compiled to complete regulations regarding higher education as part of the national education system following the law of The National Educational System. Higher education consists of (1) academic education, which has a focus on mastering science and (2) vocational education, which focuses on the preparation of graduates to apply their expertise. Higher Education Institutions that organize academic and vocational education can be distinguished based on levels and study programs that are held, namely: universities, institutes, polytechnics, academies, and community

academies. The figure below is an overview of the higher education system in Indonesia. Based on the higher education system, the position of professional teacher education can be identified. According to the Act on Teachers and Lecturers, the requirement to become a teacher is to have a minimum S1 (bachelor's degree) or Diploma IV and a professional teaching certificate. Based on these regulations, the process of academic education (S1 or D IV) for prospective vocational teachers, and professional teacher education is held in university. Vocational teacher education has begun since the early era of Indonesian independence. After Indonesia's independence, the Indonesian government feels a lack of teachers at all levels and types of educational institutions. To overcome this problem, the government established various teacher education courses. Around the 1950s, at the level above secondary education developed B-I course, B-II course, and first advanced teacher education (PGSLP stand for Pendidikan Guru Lanjutan Pertama) courses were tasked for preparing teachers for secondary schools.[14] Efforts to improve the quality and number of teachers continue to be made through the establishment of the Teacher Education College (PTPG stand for Perguruan Tinggi Pendidikan Guru) by the government through Minister of Education and Culture Decree No. 382 / Kab in 1954. PTPG was established in four cities, namely Batusangkar (West Sumatera), Manado (North Sulawesi), Bandung (West Java), and Malang (East Java). Thus, there are two types of educational institutions that produce teachers, namely B-I / B-II / PGSLP Courses and PTPG. The two institutions are then integrated into one educational institution through various stages. In 1957, PTPG was incorporated into the Faculty of Teacher Training and Education at the nearest University. Based on Government Regulation (PP) No. 51 of 1958, Pedagogic Faculty was integrated into FKIP. In 1963, the Ministry of Basic Education had established the Institute of Teacher Education (IPG) to produce secondary school teachers; while based on Minister of Education and Culture Decree No. 6 and 7, 8 February 1961 the B-I and B-II courses are integrated into the FKIP (Teacher Education and Training Faculty) under the Ministry of Higher Education which also produces secondary school teachers. This dualism is felt to

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[14] Source: http://www.unj.ac.id/en/sejarah-unj/ .

be less effective and disrupts the management of teacher education. To solve this problem, B-I and B-II courses are integrated into FKIP at one University.[15]

Through Presidential Decree No. 1 of 1963 on 3 January 1963, established the integration of teacher education institutional systems. One of the statements of the Presidential Decree is that this decree was valid since 16 May 1964, FKIP and IPG were changed to IKIP (Institute of Teacher Training and Education) at the university level. In the next development, IKIP was given an expanded mandate to develop educational and non-educational knowledge within the University. Since 1999 IKIP has been transformed into a State University, as shown below:

Table 2.14 List of University with Vocational Teacher Undergraduate Program

NO.	BEFORE TRANSFORM	AFTER TRANSFORM	LOCATION
1.	IKIP Medan	Universitas Negeri Medan	Medan, North Sumatera Province
2.	IKIP Padang	Universitas Negeri Padang	Padang, West Sumatera Province
3.	IKIP Jakarta	Universitas Negeri Jakarta	Capital Special Region Jakarta
4.	IKIP Bandung	Universitas Pendidikan Indonesia	Bandung, West Java Province
5.	IKIP Semarang	Universitas Negeri Semarang	Semarang, Central Java Province
6.	IKIP Yogyakarta	Universitas Negeri Yogyakarta	Special Region Yogyakarta
7.	IKIP Surabaya	Universitas Negeri Surabaya	Surabaya, East Java Province
8.	IKIP Malang	Universitas Negeri Malang	Malang. East Java Province
9.	IKIP Singaraja	Universitas Pendidikan Ganesha	Singaraja, Bali Province
10.	IKIP Manado	Universitas Negeri Manado	Manado, North Sulawesi Province
11.	IKIP Ujung Pandang	Universitas Negeri Makassar	Makassar, South Sulawesi Province
12.	IKIP Gorontalo	Universitas Negeri Gorontalo	Gorontalo, Gorontalo Province

Source: MOEC, Developed by author

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[15] Source: http://www.unj.ac.id/en/sejarah-unj/ .

The universities mentioned above, organizing educational programs for vocational teacher candidates with a Bachelor of Education degree following the demands of the law concerning teacher and lecturer, to become professional teachers according to the law, since 2015, graduates from the universities before serving in Vocational secondary schools will attend the 'professional teacher program" (PPG) program for 2 (two) semesters (1 year), after that they can apply for service as a vocational teacher in SMK, with the following program framework.

2.4.1.2 Implementation of Pre-service TVET Teacher Training

As explained in section 2.4.1, the implementation of education and training of prospective vocational teachers in Indonesia is the responsibility of the University in various faculty, especially in the vocational education and technology faculty (FPTK). In practice, vocational education, and technology faculty (FPTK) have a variety of study programs that are expected to produce vocational teachers in existing study programs (skill competencies) in vocational secondary schools (SMK). Still, in their implementation, the study programs in vocational education and technology faculty (FPTK) are not the same as study programs in vocational secondary schools (SMK), this can be caused by differences in levels of education, or the curriculum differentiate. Below is a table about the relation of existing study programs in university with those in SMK.

Table 2.15 Study Program Comparison between SMK and University

NO.	AREAS OF EXPERTISE	SKILL PROGRAMS	NUMBER OF SKILL COMPETENCY IN SMK	STUDY PROGRAM RELATED IN UNIVERSITY (VOCATIONAL TEACHER PROGRAM)	FACULTY
1.	TECHNOLOGY AND ENGINEERING	Construction and property technology	4	Civil engineering and planning education	Vocational education and technology faculty (FPTK)
		Geomatics and geospatial techniques	2	Civil engineering and planning education	Vocational education and technology faculty (FPTK)
		Electrical engineering	6	Electrical engineering education	Vocational education and technology faculty (FPTK)
		Mechanical engineering	6	Mechanical engineering education	Vocational education and technology faculty (FPTK)
		Aircraft technology	7	-	-
		Graphic technique	2	-	-
		Industrial instrumentation engineering	2	Electronic engineering education	Vocational education and technology faculty (FPTK)
		Industrial engineering	2	-	-
		Textile technology	4	-	-
		Chemical engineering	4	Chemical engineering education	Mathematics and Natural Sciences Education faculty (FMIPA)
		Automotive engineering	7	Automotive engineering	Vocational education and technology faculty (FPTK)
		Shipping techniques	7	-	
		Electronic engineering	5	Electronic engineering	Vocational education and technology faculty (FPTK)

2.	ENERGY AND MINING	Petroleum technique	3	-	-
		Geology of mining	1	-	-
		Renewable energy techniques	2	-	-
3.	INFORMATION AND COMMUNICATION TECHNIQUES	Computer engineering and information	4	Computer engineering and information education	Vocational education and technology faculty (FPTK)
		Telecommunications engineering	2	Computer engineering and information education	Vocational education and technology faculty (FPTK)
4.	HEALTH AND SOCIAL WORK	Nursing	1	-	-
		Dental health	1	-	-
		Medical laboratory techniques	1	-	-
		Pharmaceutical	2	-	-
		Social work	2	Family welfare education	Vocational education and technology faculty (FPTK)
5.	AGRIBUSINESS AND AGROTECHNOLOGY	Plant agribusiness	6	Agro-industry technology education	Vocational education and technology faculty (FPTK)
		Livestock agribusiness	3	Agro-industry technology education	Vocational education and technology faculty (FPTK)
		Animal health	2	Agro-industry technology education	Vocational education and technology faculty (FPTK)
		Agribusiness of agricultural processing	3	Agro-industry technology education	Vocational education and technology faculty (FPTK)
		Agriculture technique	2	Agro-industry technology education	Vocational education and technology faculty (FPTK)
		Forestry	4	Agro-industry technology education	Vocational education and technology faculty (FPTK)

6.	MARITIME	Sailing fishing vessels	2	Fisheries and marine education	Vocational education and technology faculty (FPTK)
		Trade ship	2	-	
		Fishery	5	Fisheries and marine education	Vocational education and technology faculty (FPTK)
		Fisheries processing	1	Fisheries and marine education	Vocational education and technology faculty (FPTK)
7.	BUSINESS AND MANAGEMENT	Business and marketing	2	Economic and cooperative education	Economic and business education faculty
		Office management	1	Office management education	Economic and business education faculty
		Accounting and finance	3	Accounting education	Economic and business education faculty
		Logistics	1	Business management education	Economic and business education faculty
8.	TOURISM	Hospitality and tourism	4	Family welfare education	Vocational education and technology faculty(FPTK)
		Culinary	1	Culinary education	Vocational education and technology faculty (FPTK)
		Beauty technique	2	Beauty education	Vocational education and technology faculty (FPTK)
		Fashion	2	Fashion education	Vocational education and technology faculty (FPTK)

9.	ARTS AND CREATIVE INDUSTRIES	Art	5	Art education	Art and Design Education faculty (FPSD)
		Creative design and products	5	Design and visual communication education	Art and Design Education faculty (FPSD)
		Music art	2	Music art education	Art and Design Education faculty (FPSD)
		Dance art	2	Dance art education	Art and Design Education faculty (FPSD)
		Karawitan arts	2	Music art education	Art and Design Education faculty (FPSD)
		Puppetry arts	1	-	
		Teater arts	2	-	
		Broadcasting arts and films	4	Film and television education	Art and Design Education faculty (FPSD)
		TOTAL	**146**		

Source: Data from MOEC, developed by Author

From the table above, we can see that the study programs in Vocational Schools refer more to jobs or positions. In contrast, the study programs in universities refer to broader knowledge. By comparison, graduates from universities can choose a study program in Vocational Schools to become their field expertise in accordance with the knowledge gained at the University. We can also see that not all skill programs (14 skill programs contain 31 skill competencies) that can be facilitated by universities in vocational teacher undergraduate programs.

After earning a bachelor's degree in education in a specialized vocational teacher study program, the graduates will take part in a post-study education program, namely the Professional Teacher Program (PPG) for two-semester (1 year). Below is a figure about the flow of vocational teacher education and training in Indonesia:

| Prospective Teacher (University Student) | ⇨ | Bachelor of Education (8 semester) | ⇨ | PPG (2 semester) | ⇨ | Vocational Teacher |
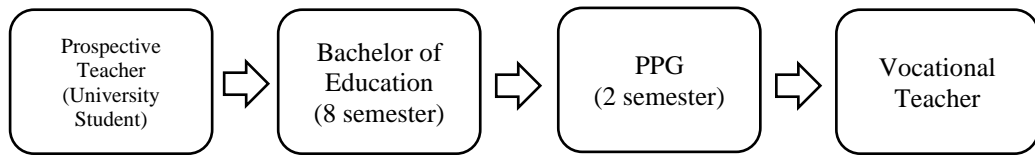
Figure 2.9 Vocational Teacher Education and Training Flow

Source: Wijanarka, 2016, p. 5-6

In practice, the PPG program can also be attended by non-educational graduates who are interested in becoming vocational schoolteachers with a bachelor's degree related to the existing study program/subject in vocational secondary schools (SMK).

| Bachelor's degree or Diploma IV Graduates : Education and non-Education | ⇨ | Matriculation of Pedagogical and/or subject related to the study program | ⇨ | 36 – 40 credits / Workshop : Teaching materials development, Micro teaching, peer teaching, Internship program |
| Educator Certificate | ⇦ | Competency Test | ⇦ | Enrichment Pedagogical and/or subject related to the study program |
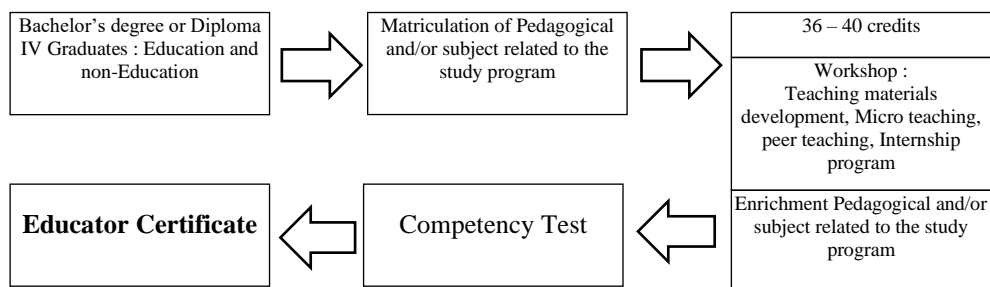
Figure 2.10 PPG Model for S1/D IV Graduates (education and non-education with a related degree with the subject in SMK)

Source: Wijanarka, 2016, p. 10

With the policy as explained above, it is expected to produce vocational teachers in accordance with the existing study programs in SMKs with the expected quantity and quality.

2.4.1.3 The Curriculum of Pre-service TVET Teacher Training

Kustija (2010) cited by Kurnia (2013, p. 29) Vocational teacher education programs in Indonesia generally consist of eight semesters, conclude with a bachelor's degree, and are designed in so-called concurrent mode. This means that

the teaching subject content is studied in parallel with the pedagogical content, which is also called integrated teacher education. A typical distribution of general subjects, vocational subjects, didactic subjects over the semesters of the concurrent model is depicted in the tables below. There are no nationally unified vocational teacher education curricula available at the moment, so the content and distribution of study programs varies from institution to institution. Study programs, however, must be accredited by the competent accreditation agency (Kurnia, 2013, p. 29). The curriculum in the vocational education program contains 144 – 150 credits, for example, below is the table of the curriculum for Automotive Education Engineering program in Universitas Pendidikan Indonesia (UPI):

Table 2.16 Example of Vocational Teacher Training Curriculum

KIND OF SUBJECT	SEMESTER CREDIT UNIT (SKS)	EXPLANATION	INFORMATION
General Subject	14	COMPULSORY	General Subject
Educational Basic Subject	12	COMPULSORY	Educational/didactic subjects
Internship Program (PPL)	12	COMPULSORY	Teaching Practice in Vocational Secondary Schools (SMK)
Professional Expertise Subject	4	COMPULSORY	vocational/technical subjects
Expertise Subject	86	COMPULSORY	vocational/technical subjects
Deepening Expansion Subject	16	Students are only required to choose 16 credits from the 40 credits offered	vocational/technical subjects
Thesis (Final Project)	6	COMPULSORY	Final thesis
TOTAL	150		

Source: Processed from http://mesin.upi.edu/content/page/Kurikulum

Below is another example from the vocational teacher training undergraduate program every semester:

Table 2.17 The Distribution of Subjects in The Teacher Education Curriculum (Electrical Engineering Education)

1 semester	2 semester	3 semester	4 semester	5 semester	6 semester	7 semester	8 semester
General Subject 30%	General Subject 20%	General Subject 10%	General Subject 0%	General Subject 10%	General Subject 20%	General Subject 0%	General Subject 0%
Educational /didactic subjects 10%	Educational /didactic subjects 20%	Educational /didactic subjects 15%	Educational /didactic subjects 25%	Educational /didactic subjects 10%	Educational /didactic subjects 25%	Educational /didactic subjects 22%	Educational /didactic subjects 100%
vocational/ technical subjects 60%	vocational/ technical subjects 60%	vocational/ technical subjects 75%	vocational/ technical subjects 75%	vocational/ technical subjects 80%	vocational/ technical subjects 55%	vocational/ technical subjects 68%	vocational/ technical subjects 0%
					Internship in SMK (PPL)	Thesis 10%	Thesis Defence
Total SKS	**18**	**98**				**30**	

Source: Kustija, 2010 cited by Kurnia, 2013, p. 29

2.4.1.4 Political Vision to Enhance Pre-service TVET Teacher Training

In Indonesia, since the two last decades, some efforts and programs have developed by the Government of the Republic of Indonesia. The Ministry of Education and Culture in revitalizing the TVET system. One of TVET system program is developing pre-service and in-service teachers training through Professional Teacher Program (PTP) or in Bahasa Indonesia is called *Pendidikan Profesi Guru (PPG)*. It is a two-semester higher education program after a bachelor's degree for a prospective teacher to have a teacher certificate as an official license to be a professional teacher. The development of science and technology brings logical consequences to the orientation of the development of teacher professionalism that is directed to develop competences. Article 10 paragraph (1)

of Law Number 14 Year 2005 concerning Teachers and Lecturers mandates that professional teacher must have pedagogical competence, personal competence, social competence, and professional competence. The four competencies that should be possessed by these teachers are holistic and constitute a unity that characterizes professional teachers. As stated in Law No 20/2003 on the National Education System, professional teacher education or PPG is higher education after the bachelor program, which prepares participants to be a professional teacher. The PPG program is an educational program organized for graduates of undergraduate education (S1) in education subjects and undergraduate (S1) non-education subjects who have talent and interest to become professional teachers. The objective of the professional teacher education (PPG) program, as stated in Minister of Education and Culture Regulation Number 87 of 2013 is to produce prospective teachers who have competence in planning, implementing, and evaluating learning, following up on results assessment, mentoring, and training of students and conducting research, and able to develop professionalism in a sustainable manner.

Following the regulation of Ministry of Education and Culture number 55 Year 2017 article 1 point 5 states that the Professional Teacher Education program or PPG is educational program after academic graduate program (S1) or applied graduate (D-4) to hold teacher certificate for teaching in Kindergarten formal education, primary education, and secondary education. After attending the program prospective teachers will receive teachers' certificate, and the graduate shall be promoted as a professional teacher as childhood & kindergarten teachers, primary school classroom teachers, subject matter teachers in junior secondary school and subject matter teachers' high secondary school as well as subject matter teachers in vocational secondary school (SMK).

The PPG Study Program is designed systematically and applied to meet quality principles ranging from selection, learning, and assessment processes and competency tests. It is expected to produce future professional teachers in every unit and type of school. Currently, the PPG prospective student selection policy is coordinated by the Ministry of Education and Culture (previously by the Ministry of Research and Technology) in collaboration with the organizing TEIs. The success of teacher professional education program that carried out by pointed

universities or TIEs organizers require the support of well-coordinated management system.

According to the regulation of the Ministry of Education and Culture number 55 Year 2017 concerning Teacher Education Standard article 20 that professional teacher program or PPG consists of two parts:

(i) PPG Pre-service Program, it has 36-40 credits, and the program is carried out in 2 Semesters.

(ii) PPG in-service program, it has 24 credits, and the program is carried out in one semester.

In all the two types of PPG programs, they contain serial workshops (as subject matters) in developing subject-specific pedagogy (SSP) learning tools such as: developing media, developing a lesson plan, developing a program for classroom action research (CAR) and teaching practice at the micro-teaching room. The next program, then, the implementation of Field Experience Practices (PPL) as real teaching practice in schools. The proportion between the SSP Workshop and Teaching Practice in general is 60% compared to 40 % of the overall PPG learning load. An overview of the structure of the PPG curriculum is presented in Table 2.18.

Table 2.18 Structural Program of PPG

No	Curriculum Content	Proportion
1.	Workshop for developing instructional program - *(Subject-specific pedagogy)*	60%
2.	Field practice - school and industrial practicum	40 %

Source: Wijanarka, 2016, p. 12

It can be noted that in the area of PPG for vocational teachers, this provision has raised a lot of pros and cons. The pros and cons are since vocational education is a type of education which does not only teach knowledge and science but also psycho-motoric skills. Thus, it needs vocational teachers who are not only having good enough science and general teaching skill but also, they have capabilities and skills on how to deliver psychomotor skill in a real-life setting in industries (Estriyanto, 2016, p. 246). TVET-teachers should have capabilities and knowledge in a particular vocational field, and they should have command of the skills required

for doing the typical jobs and tasks in this field. This experience and know-how can only be acquired by practical situations in companies or industries where professional standards of excellent performance must be met. In addition, a TVET-teacher must combine this practical "know-how" with theoretical knowledge when planning the proper steps for carrying out a task. Part of this is understanding "why" a vocational task will be carried out in this way and not in another. To "know why" is the result of theoretical studies and reflection based upon practical experience. (Gerds and Zhao, 2006, p. 128).

The pro assumes that teacher development can be carried out consecutively. It means that a teacher of mechanical engineering, as an example, can be developed from a pure bachelor's degree of mechanical engineer by giving additional pedagogical knowledge and skills. On the other hand, the counterparty rejects the argument because they assume that a bachelor's degree in mechanical engineer does not have enough competence aspects needed to be a vocational teacher. (Estriyanto, 2016, p. 246).

As mentioned in Regulation from Indonesian Ministry of Indonesian National Education, no 16 year 2017 concern of standard of academic qualification and teacher Competencies. The teachers at SMK must have a minimum educational diploma qualification of four (D-IV) or undergraduate (S1) study programs that are appropriate for the subjects taught/taught and are obtained from accredited study programs. In fact, it is addressed only for normative and adaptive teachers at SMK, while the productive teachers need some additional competencies. There are three types of subject matter teachers in Vocational Secondary schools. First, normative teachers who teach subjects such as Indonesian, English, and Counselling Guidance. Second, the adaptive teacher is a teacher who teaches basic abilities, namely mathematics, chemistry, and biology. Third, productive teachers are teachers who teach in certain fields for building vocational skills such as buildings, electricity, machinery, namely specific fields, for example, in the fields of engineering, agriculture, and science.

Based on the information above, it is needed to clear up what is missing from the pre-service teacher education and certification on the program of PPG for vocational secondary schools. Adaptive and normative teachers are trained by the

non-vocational educational study. PPG trains them in accordance with the subjects they are mastered. While productive teachers are trained by attending the PPG program on TVET. In terms of the program, adaptive and normative teachers are trained under the flow chart and mechanism as the following figure.
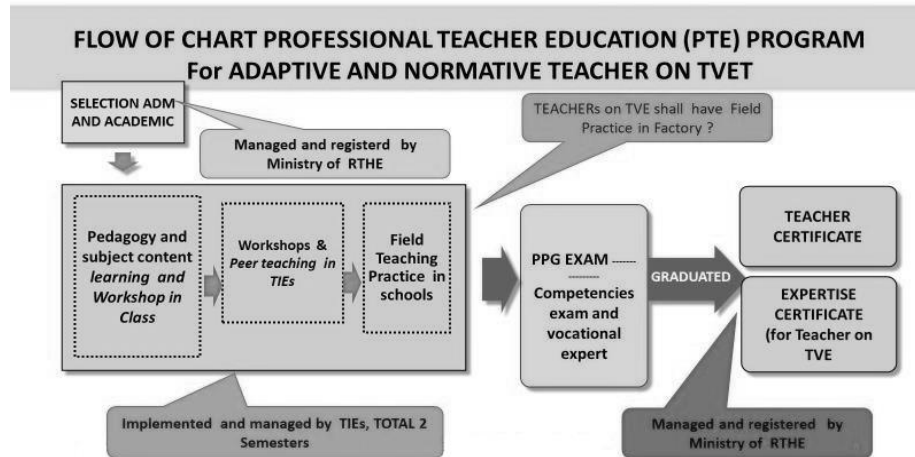
Figure 2.11 Flow of chart of PPG for Adaptive and Normative TVET Teachers

Source: Wahyudin, 2019

On the other hand, productive teachers that responsible for teaching in certain fields for building vocational skills, on PPG program of TVET, prospective teachers on TVE are necessary to have both field teaching practice in vocational secondary school or SMK, and they also have a period of training in industries and factories. The flowchart and mechanism of the professional teacher education (PPG) program can be seen in the following figure.
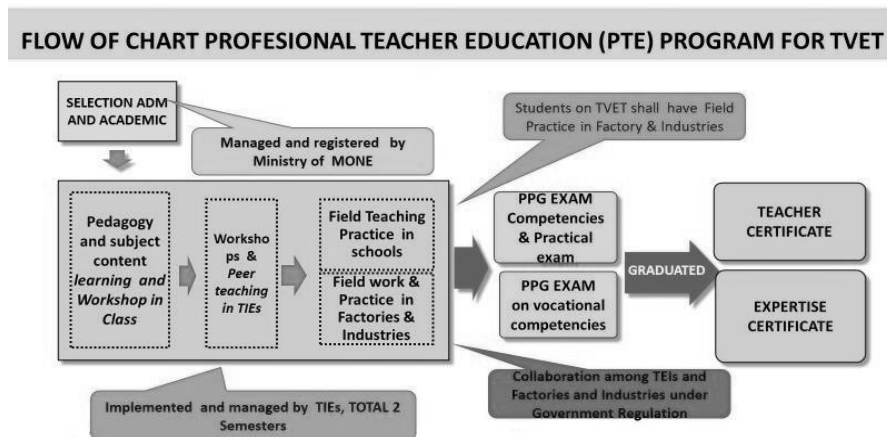
Figure 2.12 Flow of chart of PPG for Productive TVET Teachers

Source: Wahyudin, 2019

Currently, the Centre of Excellency on TVET in Universitas Pendidikan Indonesia is underway to establish. As a center of excellency on TVET in Indonesia, some leading programs are developed under the COE of TVET. Some main programs are as the following.

a. Revitalizing Professional Teacher Education Program on TVE;

b. Applied Approaches (AA) and PEKERTI Program for Vocational Lecturer in Universities or Poly-techniques.

c. Various short training and workshops for existing Vocational Teachers.

In terms of the program, it can be seen on the following road map.

Table 2.19 The Road map of Professional TVET Teacher Education

No.	Activities	1st yr	2nd yr	3rd yr	4th yr	5th yr
1	Implementing currently/existing PTE (PPG) Program on all subjects under managed by MOEC (included with PTE vocational education)	▓				
2	Coordinating and establishing task force for developing PTE on technic and vocational education	▓				
3	Training for trainers/upgrading course for lecturers or instructors from industries on subjects for PTE on vocational education	▓				
4	Developing curriculum program, syllabus of PTE on TVET collaborated with related stakeholders (schools, industries)		▓			
5	Developing contents, media and related learning sources of PTE on vocational education		▓			
6	Implementing and evaluating of PTE program on vocational education		▓	▓	▓	▓
7	Developing and evaluating PTE program on vocational education				▓	▓

Source : Wahyudin, 2019

In developing Centre of Excellency on TVET in Universitas Pendidikan Indonesia (CoE UPI TVET), collaboration and synergy among related components among subunits in internal UPI or coordination among the external organization are essential. Those collaboration will lead the Center on TVET in UPI to be a leading and outstanding TVET organization that will contribute significant benefit for the generating development of human resources in vocational areas and industries. The synergy of CoE TVETs components can be figured out in the following figure.
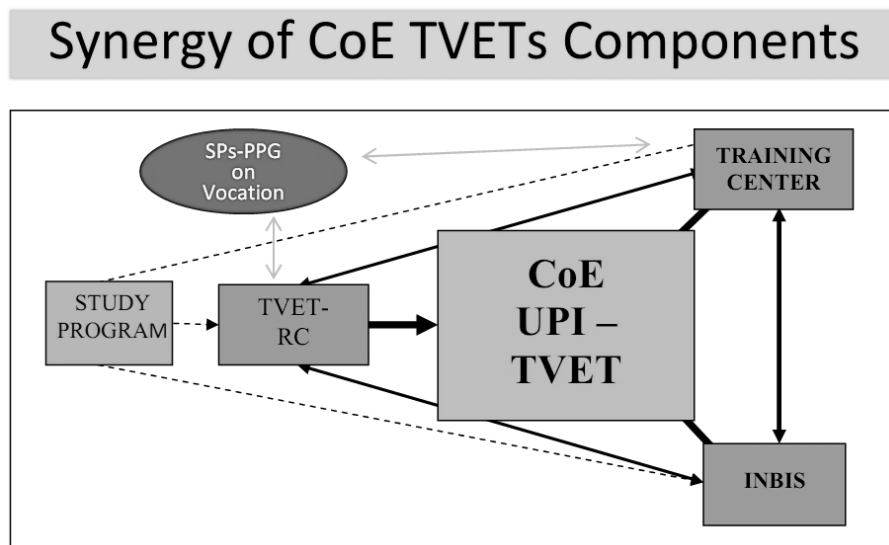
Figure 2.13 The Synergy of CoE TVETs Components

Source : Barliana, 2019

2.4.2 In-service Teacher Training

Until now, the population growth of Vocational secondary schools (SMK) has reached more than 3,000 new SMKs, which directly contribute to the growth of secondary school students and especially SMK students by more than 1 million students. With this significant growth, the configuration of high school students compared to vocational school has shifted from 60% of high school students: 40% of vocational students to 49% of high school students: 51% of vocational students (MOEC, 2015, p. 121). Based on the current total population of SMKs, 73.9% are SMKs established by the community, and only 26.1% were established by the Government (MOEC, 2015, p. 123). An interesting fact is the population of state vocational secondary schools is only 25.8% of the total SMKs in 2013 but has more students than private vocational secondary schools, which are reached 40.3%. Other

interesting facts are also shown in the distribution of students based on the area of expertise taken. It can be seen that there is a declining trend in almost every sector except the Information and Communication Technology (ICT) and The Healthcare sector with an increase of ± 1-2% per year. Junior high school graduates interested in the ICT and healthcare sector are strongly influenced by the increasing market demand for SMK graduates in these two fields. The trend of Vocational School students in the areas of Agribusiness and Agro-industry sector was in a constant direction from year to year. This continuous growth indicates that Indonesia's agricultural potential is not yet attractive to junior high school graduates. Therefore, special treatment is needed to increase the interest given that Indonesia is still very lacking in skilled workers in Agribusiness and Agro-industry expertise. While the declining growth trend is seen in the areas of arts, crafts and tourism sector, Business and management, and Technology and Engineering, a very significant downward trend occurred in the field of Business and Management sector where this sector has decreased by almost 5%. The causes of the decline include the market has begun to saturate with business and management graduates. Educators are one of the main factors affecting the quality of education in a country. Based on Law number 20 of 2003, educators consist of teachers, lecturers, counsellors, tutors, facilitators, and other names who participate in the administration of education. Following the mandate of Government Regulation No.74 of 2008, all teachers in secondary schools must have a minimum qualification of bachelor's degree (S1/D4) in 2015. This qualification is needed so that teachers have sufficient knowledge about the subjects being taught. However, until 2013, there were still 9% of high school and vocational school teachers who had qualifications below the bachelor's degree (S1/D4). Especially in vocational secondary schools, the productive teachers take more responsibility in teaching both in a theoretical and practical session. Indonesia still lacks productive teachers in vocational schools. The lack of productive teachers is experienced in almost every province, such as the results of research conducted in eight provinces coordinate by Directorate of Vocational secondary schools (SMK) Development namely Central Java, Special District of Yogyakarta (DIY), East Java, West Java, Special District of Jakarta, Lampung, South Kalimantan, and West Nusa Tenggara. Respondents included the Provincial

Education Office, the TVET teacher training centers (P4TK), which organized a dual expertise program, the P4TK instructor, the Principal of the Vocational Secondary Schools, the teacher participating in the dual expertise program and the related department. (MOEC, 2017). The development and improvement of teacher competencies, as referred to Government Regulation No. 74 of 2008, is carried out through a system of sustainable professional development (PKB), which includes education and training, apprenticeships, scientific publications on research, and so on. The form can be the following activities:

Table 2.20 TVET Teacher Training Modes in Indonesia

NO.	ACTIVITIES	TARGET	RESPONSIBLE INSTITUTION
1.	In-House Training (IHT)	All Teachers	Teachers Working Groups (KKG) and Subject Teachers Deliberations (MGMP)
2.	Industrial Apprenticeship Program	Productive Teacher	Vocational Secondary Schools (SMK) and TVET Teacher Training Centers (P4TK)
3.	Training trough schools partnership	Productive Teacher	Vocational Secondary Schools (SMK) and TVET Teacher Training Centers (P4TK)
4.	Distance training and learning	Productive Teacher	Vocational Secondary Schools (SMK) and TVET Teacher Training Centers (P4TK)
5.	Tiered or special training	Productive Teacher	Vocational Secondary Schools (SMK) and TVET Teacher Training Centers (P4TK)
6.	Short courses	Productive Teachers	Vocational Secondary Schools (SMK), TVET Teacher Training Centers (P4TK) and University (LPTK)
7.	Internal coaching	All Teachers	Vocational Secondary Schools (SMK)

Source: Source : MOEC, 2017, p. 16-18

Sustainable Professional Development (PKB), based on the provisions of The Ministry of Administrative and Bureaucratic Reform Regulation No. 16 of 2009 regarding functional teacher positions and credit scores, is based on the fact that teachers have a significant role in improving the learning process and the quality of students. One of the fundamental changes contained in the regulation Number 16 of 2009 is the assessment of teacher performance; what was previously still more administrative is now becoming more practical, quantitative, and

qualitative oriented, so that teachers are expected to be more motivated to improve their performance and professionalism. In the policies that have been set, functional positions consist of four levels, namely First Teacher, Junior Teacher, Intermediate Teacher, and Primary Teacher. Every year, teachers must be assessed regularly through Teacher Performance Assessment (PK Guru) and must take part in Sustainable Professional Development (PKB). The PKB must be done since the teacher is in rank III/a by carrying out self-development, whereas since the rank III/b, the teacher is required to carry out scientific publications and/or innovative works. In addition to the teacher competency development programs mentioned above, GIZ (2013) recommended five models of vocational teacher education. First, the concurrent or integrative model. Second, the consecutive model, in which a person obtains qualifications as a teacher after graduating from university (bachelor or master). Third, the model for recruiting practitioners from the workforce. Fourth, the model of recruiting practitioners who have a bachelor's degree. And the fifth model is the recruitment of expert workers (real practical practitioners). At present, of the five models, Indonesia applies the first model, the concurrent model. After the Law on Teachers and Lecturers was published, and Teacher Professional Education (PPG) was implemented, the first and second models were implemented in Indonesia (Wijanarka, 2016, p. 6). In implementing sustainable vocational teacher competency development, Ministry of Education and Culture regulation number 16 of 2015 about the organization and work procedures of Center for Development and Empowerment of Teachers and Education Personnel, ministry of education and culture has TVET teacher training centers spread across Indonesia with their respective fields of specialization, namely:

1. Center for Development and Empowerment of Educators and Education Personnel (PPPPTK) in the field of Machinery and Industrial Engineering, in Bandung, West Java.

2. Center for Development and Empowerment of Educators and Education Personnel (PPPPTK) in the field of Building and Electricity, in Medan, North Sumatra.

3. Center for Development and Empowerment of Educators and Education Personnel (PPPPTK) in the field of Automotive and Electronics, in

Malang, East Java.

4. Center for Development and Empowerment of Educators and Education Personnel (PPPPTK) in the field of Business and Tourism, in Depok, West Java.

5. Center for Development and Empowerment of Educators and Education Personnel (PPPPTK) in the field of Agriculture, in Cianjur, West Java

6. Center for Development and Empowerment of Educators and Education Personnel (PPPPTK) in the field of Arts and Culture, in Yogyakarta

7. Center for Development and Empowerment of Educators and Education Personnel (LPPPTK KPTK) in the field of Maritime Affairs, Fisheries, Information and Communication Technology, in Gowa, South Sulawesi.

Based on the decree of the minister of education and culture No. 756 / P / 2020 concerning nomenclature of the ministry, organizational units, and work units of the ministry of education and culture, due to organizational changes at the Ministry of Education and Culture, since 2020 there has been a change in the names and functions of the above institutions to:

Table 2.21 In-service TVET Teacher Training Institutions

NO	PREVIOUS NAME	CURRENT NAME
1.	Center for Development and Empowerment of Educators and Education Personnel (PPPPTK) in the field of Machinery and Industrial Engineering, in Bandung, West Java.	Center for Quality Assurance Development of Vocational Education (BBPPMPV) in Mechanical and Industrial Engineering
2.	Center for Development and Empowerment of Educators and Education Personnel (PPPPTK) in the field of Building and Electricity, in Medan, North Sumatra.	Center for Quality Assurance Development of Vocational Education (BBPPMPV) in Construction and Electricity
3.	Center for Development and Empowerment of Educators and Education Personnel (PPPPTK) in the field of Automotive and Electronics, in Malang, East Java.	Center for Quality Assurance Development of Vocational Education (BBPPMPV) in Automotive and Electronics

4.	Center for Development and Empowerment of Educators and Education Personnel (PPPPTK) in the field of Business and Tourism, in Depok, West Java.	Center for Quality Assurance Development of Vocational Education (BBPPMPV) in Business and Tourism
5.	Center for Development and Empowerment of Educators and Education Personnel (PPPPTK) in the field of Agriculture, in Cianjur, West Java	Center for Quality Assurance Development of Vocational Education (BBPPMPV) in Agriculture
6.	Center for Development and Empowerment of Educators and Education Personnel (PPPPTK) in the field of Arts and Culture, in Yogyakarta	Center for Quality Assurance Development of Vocational Education (BBPPMPV) in Arts and Culture
7.	Center for Development and Empowerment of Educators and Education Personnel (LPPPTK KPTK) in the field of Maritime Affairs, Fisheries, Information and Communication Technology, in Gowa, South Sulawesi.	Center for Quality Assurance Development of Vocational Education (BPPMPV) in Maritime, Fisheries, Information and Communication Technology

Source: decree of the minister of education and culture No. 756 / P / 2020

3. States of the art and development of TVET

3.1 Technical and Vocational Education and Training (TVET)

The field of technical and vocational education and training (TVET) has changed throughout history, usually in response to the demands made upon it by the societies it serves. The current term—TVET—requires both definition and differentiation from other designations. Vocational education and training are probably as old as humanity, and knowledge, skills and belief systems have been transmitted from one generation to the next since the origins of humankind. Over time, various terms have been used to describe elements of the field that are now conceived as comprising TVET. These include apprenticeship training, vocational education, industrial arts, technical education, technical/vocational education (TVE), occupational education (OE), vocational education and training (VET), career and technical education (CTE), etc. Several of these terms are commonly used in specific geographical areas. For example, in Europe the term vocational education and training (VET) is in common usage, while in the United States the current term is career and technical education (CTE). In addition, many in the field are advocating the use of continuing vocational education and training (CVET). There are also several different dimensions that can be used to define vocational education and training—for example: its venue (company-based, apprenticeship, school-based), character (initial, continuing), etc (Maclean and Wilson, 2006, p. 5). There are many contributions of Technical and Vocational Education and Training (TVET) on a nation's economy. TVET has been proved as the key for skill development. With its feature focused on specific occupation, it has allowed individuals to find skill related jobs or start own employment (Bhurtel, 2015, p. 78). The TVET system is gradually recognized by the government as very important to economic development by focusing on skills in the labor market. TVET is also recognized as an effective means of empowering young people to engage in productive and sustainable livelihoods (UNESCO, 2005). The potential of technical and vocational education and training (TVET) to drive progress and transform societies is widely acknowledged. The European Union (EU) refers to it as the "engine of economic development and international competitiveness" (Azzoni and

Arbizu, 2013, p. 13). Others highlight its capacity to contribute to more humanistic goals such as social inclusion, and sustainable and socially just economic prosperity (Wheelahan and Moodie, 2016, p. 74). A high proportion of the population of poor countries remains unskilled, richer countries are struggling to meet the human capital demands of rapidly changing work environments and, almost universally, TVET remains the "poor relative" of education systems both in terms of perception and attention (Campbell, 2015, p. 7). In this context Lauglo (2009) saw TVET refers to deliberate interventions to bring about learning which would make people more productive in designated areas of economic activity (e.g., economic sectors, occupations, specific work tasks). It is remarkable that in many countries (Indonesia one of them) vocational education and training has failed to achieve the level of social recognition that is needed to establish a profession.

Wheelahan and Moodie (2016, p. 12) reminds us in their paper, UNESCO's global education agenda (2030) sets out a new vision for education for the next 15 years. It was developed to support the United Nations' 2030 Agenda for Sustainable Development, which comprises 17 sustainable development goals. While recognising that education is essential to support all the sustainable development goals, sustainable development goal 4 is a specific commitment to: "Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all" (UNESCO, 2015a). The global education agenda 2030 comprises two components: the first is the 2015 Incheon Declaration, which is the agreement of the worldwide education community for this new vision; and the second is the Education 2030 Framework for Action, which outlines how to translate the commitments in the Incheon Declaration into action at global, regional, and national levels, and provides guidance on how this can take place (UNESCO, 2015a). Education 2030 differs from prior strategies which emphasised universal access to basic education, while this strategy emphasises lifelong learning opportunities, including vocational education, higher education, and adult learning. While all the targets specified in Education 2030 have implications for vocational education, and vocational education will play a role in meeting all these targets, there are two targets specified in the Framework for Action that explicitly concern vocational education: "Target 4.3: By 2030, ensure equal access for all women and

men to affordable and quality technical, vocational and tertiary education, including university" (UNESCO, 2015a) and "Target 4.4: By 2030, substantially increase the number of youth and adults who have relevant skills, including technical and vocational skills, for employment, decent work and entrepreneurship" (UNESCO, 2015a).

The various strategies and outcomes specified in the Framework for Action would significantly improve the position of vocational education and its ability to contribute to social and economic development, social inclusion, and human rights. Tikly (2013, p. 25) argues that while UNESCO and the International Centre for Technical and Vocational Education and Training of the United Nations Educational, Scientific and Cultural Organization (UNESCO-UNEVOC) do not explicitly refer to the capabilities approach, nonetheless this implicitly underpins many existing projects and programs. This is evident in the Framework for Action not just in the way it envisages how education can contribute to achieving sustainable and inclusive outcomes, but also in the elaboration of the enabling conditions that education requires to achieve these goals by emphasising the need for cross-sector policies to address "the social, cultural and economic barriers that deprive millions of children, youth and adults of education and quality learning" (UNESCO, 2015a: 10). However, the means for translating the goals and targets in the Framework for Action are limited. While UNESCO's (2015b) Recommendation concerning Technical and Vocational Education adopted in November 2015, presents a vision of the role of vocational education that reflects the aspirations in Education 2030, it does not commit governments to invest in vocational education, instead calling for diversified and innovative sources of funding.

3.2 Status of Technical and Vocational Teacher

TVET Teachers must be enabled to link closely with the world of work and local/regional communities/society to identify the real training needs and to develop appropriate training programs as well as for youth, adolescents and adults" (Stolte, 2009, p. 44). In current situation, Spöttll (2009, p.5-6) described that as TVET

Teacher He or she must fancy his or her students, he or she must identify himself or herself with the school, he or she must be able to work under psychological pressure and should be curious!

Apart from this – and this is more or less self-explanatory – a teacher must be:

- a social worker,
- a psychologist,
- a mediator,
- a communicator,
- a team worker,
- an expert,
- a "knowledge networker".

He or she must also be able to get acquainted with new subjects, to access new subjects, to work with different target groups and above all he or she must have a lot of empathy and intuition.

- Teachers work with progressive tuition concepts, promote the students in all competency dimensions and enable them to acquire sustainable knowledge.
- Teachers develop the readiness for life-long learning. Firstly, they cannot be prepared for every kind of situation during their occupational career. Secondly the economic and social conditions are swiftly changing.
- Teachers co-shape the development of schools and the comprehensive process of restructuration in vocational schools in terms of concepts, curricula, and organisation.

With regard to the subject oriented implementation, it is planned that the learning process as a starting point for theoretical reflection focuses on the subjectively experienced practice. This means in more detail (cf. Figure 2):

- the young teachers become aware of their subjective concept,
- the young teachers learn a lot of different modes of acting and try them out in practice,
- the young teachers are given instruments for the reflection of practical instruction in a context of theory and of the own person.

Young teachers should be given a lot of opportunities to co-shape their training according to their experience and the needs resulting thereof (Spöttll, 2009, p. 6).
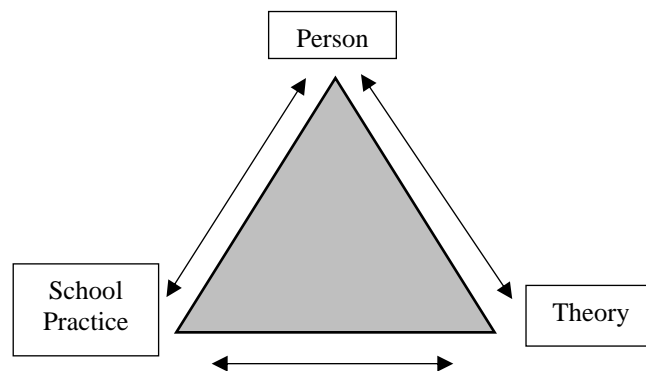
Figure 3.1 Relation between theory – person – school practice.

Source: Spöttll, 2009, p. 6

At the very center of quality technical and vocational education and training lies an effective interaction between teachers / trainers and learners. In fact, an overall improvement in vocational skills for employability and citizenship can only be realized if there is an improvement in the quality, effectiveness, and relevance of teaching (Mclean, 2006). In many countries, teachers at vocational schools have qualifications at the Bachelor's level – either formal or non-formal. The variety of settings corresponds to the conditions and traditions of vocational education in these countries. There are good reasons to tie in with these traditions and preserve the variety of paths towards the profession of TVET teachers. The introduction of international standards for the education of TVET teachers at the bachelor's level is, therefore, far from being urgent and might be counterproductive (Rauner and Dittrich, 2006, p. 1). Additionally, many of the issues and challenges facing TVET teachers are quite different from those confronting general teachers (UNESCO-UNEVOC, 2012). Demands for close collaboration with business and industry partners, the need to maintain up-to-date knowledge of rapidly changing work environments and the call for dual expertise in practical and pedagogical skills add complexity to the role of TVET professionals (ILO-UNESCO, 2018, p. 1). Attracting high-qualified staff into teaching and teacher training in technical and vocational education was a problem for most countries, often because pay and conditions were better in commerce and industry (Hostmark- Tarrou, 1988). Therefore, some countries have taken steps to increase the salary, pension, working

hours and status of such teachers. Some countries have implemented a pre-recruitment system where teachers are recruited without full qualifications (Newman 1994). Thus, governments must formulate regulations and implement mechanisms for technical and vocational teacher education. Must emphasize the role of employers in helping to meet the needs of effective technical and vocational education and technical and vocational teacher education (UNEVOC, 1997). Yet, in many parts of the world there is a traditional consensus that such education is the responsibility of educational institutions and of the government. However, its being increasingly realized that such a narrow concept of those responsible for this area of education, does not meet its needs for the world of work has a very significant part to be done (Quershi, 1997, p. 87). Since the goal of technical and vocational education (TVE) is to improve the level of general education and provide professional skills, teacher trainees should be given a more adequate cultural foundation (mother tongue, modern language, social science, etc.). More emphasis should be placed on teaching skills. It must not be assumed that vocational professional competence is sufficient to ensure effective classroom teaching, especially in meeting the wide range of capabilities and background characteristics of today's classes (Newman, 1994. P. 8; Banks, 1996, p. 203). As the pace of technological change continues to accelerate, the question of how technical and vocational teachers can best maintain their professional skills has become more difficult. In extreme cases, due to fundamental changes in the industry or the disappearance of the oven, teachers must be fully trained (Newman 1994). One of the best ways to provide teachers with on-the-job training is to provide them with direct industrial or commercial training and experience. This also has the advantage of improving the teacher's motivation and self-esteem. However, such industry experience should not be too narrowly linked with specific commercial products, and on-the-job training should be better linked with initial training. Therefore, it is best to draw attention to the types of TVET teacher training and their qualifications.

3.2.1 Types of TVET Teachers

In the context of vocational and technical education and training teachers and trainer, many theories are recognized worldwide, and the terms "vocational training teachers" and "initial vocational training teachers" are broadly referred to two large professional groups: Teachers, mainly trainers who work in technical or vocational institutions and trainers who work in companies or non-academic training centers (Cordova, et al 1995, p. 16). In Germany, teachers who mainly work in technical schools or vocational schools, while trainers are skilled workers in enterprises, providing trainees with the knowledge and practical skills required for the profession (Schneider, et al 2009, p. 41). According to Hortsch (1999) teachers can be divided into three groups as follows:
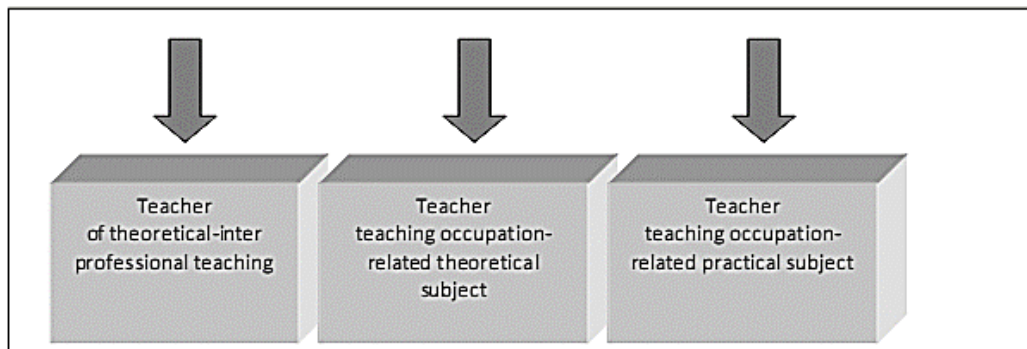
Figure 3.2 Teachers at Vocational Schools

Source : Hortsch 1999

1. Theory teacher. This category provides theory and general work-related courses in the classroom. The qualification for this kind of teaching appointment is the course of study, followed by the examination for the advanced teaching appointment and a two-year qualification teacher training period (Cordova, et al 1995, p. 26). The teacher at this point must be able to convey to participants the knowledge of the science they are learning, and thorough information on work placement is also required to enable the teacher to use the apprentices' work experience and to assess the practical impact of the theory of the profession that is being taught. According to Schneider, et al (2009, p. 42) these teachers provide young people with the necessary theoretical knowledge of the subject and in-depth

and extended general education in the context of their future profession. They teach both vocational subjects (e.g. metalworking techniques, electrical engineering, home economics, and healthcare) and general subjects (e.g. German, English, mathematics, politics, and physics).

2. Theoretical and inter-professional teachers. Teachers undergo special professional educational courses aimed at becoming a TVET teacher - a parallel model. Students choose TVET teaching as their career at the beginning of their studies and being a TVET teacher is the basic and perhaps the only aspect of the professional identity of these teachers. (Moos, L. et al 2006). Their task is to provide young people undergoing in-company training with subject specific practical teaching.

3. Teachers teaching occupation-related practical subject (Hortsch 1999). These teachers mostly master craftsmen or technicians with additional advance training imparting practical skills. They teach in industrial/technical and home economics schools and in business schools. In vocational schools (industrial/technical schools), state-examined technicians or certified masters are used to teach vocational practice. In home economics schools, specialized teachers teach home economics and crafts. In business schools, specialized teachers are trained to teach word processing and office management (Schneider, et al 2009, p. 42).

There are many differences between the term teachers and trainers such as:

Teachers are employed in various vocational schools and trainers are skilled workers in enterprises; teachers are responsible for the theoretical part of VET while trainers are responsible for the practical part of VET. In Germany, the term "trainer" is used in conjunction with in-company training as a generic term. Coaches instruct trainees as their main or additional work. In small or medium-sized enterprises with few interns, training is often a secondary job of the trainer. In larger companies, training is usually the main activity of the trainer and works in training departments. Trainers are of particular importance as they are qualified employees who, in addition to specialized tasks, perform training tasks in company departments, on assembly lines, in sales and engineering offices or in the service sector. (Schneider, et al 2009, p. 45). The current condition of vocational teachers has experienced

significant changes in terms of the types, responsibilities, roles, required skills and managerial abilities that are needed by today's vocational teachers. The first of these influential changes is technological advancement. Technology both stimulates and demands a transformation in the way TVET personnel carry out their roles. As with general education, TVET staff are expected to integrate the latest technology into classroom practice to best prepare students for life beyond education (Latchem, 2017; UNESCO-UNEVOC, 2013; Majumdar, 2011a, p. 12). Doing so is often hailed as an opportunity to increase access, quality, and equity in the classroom. This includes calls to offer distance and online TVET learning, simulations of practical work and a greater individualization of learning through adaptive technologies (ILO-UNESCO, 2018, p. 2). in Indonesia, vocational teachers have experienced changes from time to time. Currently, vocational teachers in Indonesia are required to have several competencies at once, In the daily learning process, teachers assigned in vocational secondary schools are normative teachers, adaptive teachers, and productive teachers.

(1) Normative teachers are those who teach subjects that function to shape students into whole individuals, who have the norms of life as individual beings and social beings, both as citizens of Indonesia and as citizens of the world. Normative subjects are given so that students can live and develop in harmony in their personal, social, and state life. This subject is more focused on the norms, attitudes, and behaviours that must be taught, instilled, and trained to students. Normative Subjects apply equally to all study programs in Vocational secondary schools (SMK). The subjects consist of Religious Education, Citizenship Education, Indonesian Language, Physical Education, Sports & Health, Cultural Arts Education.

(2) Adaptive teachers are those who teach subjects that function to form students as individuals to have a broad and robust knowledge base to adapt to changes in the social environment, work environment, and be able to develop themselves following the development of science, technology, and art. Adaptive programs contain subjects that focus more on providing opportunities for students to understand the basic concepts and principles of science and technology that can be applied to everyday life and or underlie

competencies for work. Adaptive subjects are given so that students not only understand "what" and "how" a job is done, but also provide an understanding and mastery of "why" it should be done. Adaptive programs consist of groups of subjects that apply equally to all skills programs and subjects that only use specific skills programs according to the needs of each study program. The subjects included are Mathematics, English, Natural Sciences, Social Sciences, Entrepreneurship, Computer Skills & Information Management.

(3) Productive teachers are tasked to train students to have working competencies according to the Indonesian National Working Competency Standards (SKKNI) and make students become qualified skilled workers in specific jobs that are suitable for industrial needs. They teach subjects that are following the competencies that are the main elements of Vocational Secondary Schools graduates. Responding to the demands, productive teachers in Indonesia must have theoretical and practical abilities. The detail of the requirement of TVET Teacher in Indonesia can be seen in figure below.

Figure 3.3 The Requirement of Indonesian Vocational Teacher

Source: Surono and Wagiran, 2016, p. 99-100

Here is the explanation of Figure 3.3 Indeed, a TVET teacher needs capabilities based around knowledge, technical and personal attributes, and the ability to impart those capabilities to others. They must be able to balance their

teaching expertise with up-to-date knowledge and experience of an ever-changing industry. They need pedagogical skills, industry experience, and academic knowledge (ILO, 2010, p. 13). Going a step further, Maurice-Takerei (2017, p. 570) argues that given the profile of the typical TVET student in many TVET systems (lower socio-economic background, lower cognitive ability) the real everyday work of a TVET teacher is "a combination of educational work, social development, and career development combined with a strong measure of care, patience, and understanding." Having pedagogical competence, personal competence, and social competence in the formulation of an ideal profile that is broadly in line with the competency formulation in Law Number 14 of 2005 concerning Teachers and Lecturers, which was further elaborated in Minister of Education Regulation Number 16 of 2007 concerning Academic Qualification Standards and Teacher Competence, and Government Regulation Number 74 of 2008 concerning Teachers, Two other competencies, namely competency of expertise and managerial competence, are findings in research conducted before concerning teachers competency formulation based on the policy context in Indonesia. (Surono and Wagiran, 2016, p. 101).

3.2.2 Qualification of TVET Teacher

Qualification means an active process of acquiring competences in each discipline and multidisciplinary contexts, and the sum of all knowledge, abilities, and skills that an individual must possess in order to successfully perform tasks and responsibilities (Nanga, 2007). Qualifications here relate primarily to the education and training of an individual as measured by the ability and ability to perform duties (Bjornavold, 2000, p. 24). Although, the qualifications of TVET teachers at technical and vocational schools and training centers are different from the general education sector (Schrembs, 2001). In Germany, for instance trainers must have the required technical qualification to train. They must have trained for occupation in which they are to act as trainers or have a comparable qualification recognized by law. Moreover, they will only be registered as trainers if they have an examination pass documenting their occupational and work teaching qualifications (CEDEFOP,

1994). According to Grollmann and Rauner (2007, p. 2) some basic models based on teacher qualifications can be distinguished as follow:

- A model mainly based on the recruitment of practitioners in a specific field of work who have completed additional courses in teaching and training management techniques, usually culminating in a teaching diploma that provides the necessary qualifications to work in the education sector.

- A model which is based on sequence of studying the subject matter, e.g. on the Bachelor of Art (B.A) level and obtaining an appropriate entry qualification to education sector through acquiring general skills in a designated courses program.

- A model which is based on the concurrent study of a subject matter and educational sciences leading to Bachelor of Art (B.A) or Master of Art (M.A) degree.

- A model based on an integrated conception of vocational disciplines, which entail the subject matter as derived from the world of work (Grollmann and Rauner, 2007, p. 2).

At present the precise qualification of vocational teachers remains a hot topic among experts, whether sufficient at undergraduate level or required at master's level. Therefore, we must look carefully at how the ideal requirements for the TVET Teacher. Regarding the qualification, it also met to develop and implement an international master's degree standard in teacher and trainer education in TVET (Bünning and Jenewein, 2006, p. 45). If the qualification of TVET teachers ends at the Bachelor's level, and if there is no opportunity to qualify as a TVET Master, then the profession of TVET teachers cannot develop beyond the status of a semi-profession and will be excluded from research and development and the related international cooperation in the field. Only with the establishment of post-graduate programmes can the foundations be laid for the qualification of researchers and scholars required in a doctoral programme – and for the establishment of a TVET research infrastructure (Rauner and Dittrich, 2006, p. 2). In many countries, vocational education and training has a low standing compared to general education and university studies - sometimes to the point of stigmatization. In other countries, on the other hand, TVET has a good reputation.

This holds, for example, for central European countries like Switzerland, Austria, Denmark, and Germany. In all these countries, the high professionalism of teacher education contributes considerably to the quality and the high social standing of vocational education (Rauner and Dittrich, 2006, p. 2).

3.2.3 Capabilities and Competencies of TVET Teacher

Capability is more than competence. Certainly, a TVET teacher needs capabilities based around knowledge, technical and personal attributes, and the ability to impart those capabilities on others. They must be able to balance their teaching expertise with an up-to-date knowledge and experience of an ever-changing industry. They need pedagogical skills, industry experience and academic knowledge (ILO, 2010, p. 13). Going a step further, Maurice-Takerei (2017) cited by ILO-UNESCO (2018, p. 10) argues that given the profile of the typical TVET student in many TVET systems (lower socio-economic background, lower cognitive ability) the real everyday work of a TVET teacher is "a combination of educational work, social development and career development combined with a strong measure of care, patience and understanding". Teachers should not only have academic qualifications and practical life experience; they must be trained to translate this experience into their teaching philosophy (Stolte, 2009, p. 44).

(A UNESCO report on the CPD of TVET teachers) summarizes the work of TVET personnel as requiring:
- theoretical, technical, or subject knowledge.
- practical skills related to a vocational field.
- current knowledge of industrial practices and work processes.
- theoretical pedagogical knowledge; and
- practical pedagogical skills and know-how of pedagogical practice (UNESCO, 2014).

In a report on TVET teachers and trainers, ILO (2010, p. 19) adds the following:
- a high degree of functionality in information and communications technology (ICT) and technological processes.

- general understanding and ability to share larger economic and social realities with students.
- ability to function collaboratively with external and internal colleagues.
- research, reflection and change as necessary in teaching practice.
- ability to communicate and empathize with students; and
- capacity to innovate and impart innovation in learning.

Definition of competence is defines as what individuals know or can do in terms of knowledge, skills, and attitude, the capability is extent to which individuals can adapt to change, generate new knowledge, and continue to improve their performance (Fraser and Greenhalgh, 2001, p. 799). Based on this differentiation between capability and competence; Schrembs, (2001) has stated that an instructor must have a variety of competencies such as:

1. **Personal competencies**

    Some people might have a particular talent for teaching, but most people do not. However, teaching can be learnt. A major prerequisite for this is that a person wants to teach. Someone who is urged to teach can never be a good teacher. Apart from abilities that can be trained, a teacher should have some character capabilities. Some teachers have a well-balanced personality. This will help trainees to build up confidence in the instructor and lead to a good mood in the classroom. He/she should have natural authority and be able to guide young people. Stolte, (2009, p. 42) has stated others personal competencies such as readiness for change, emotional stability, resilience, diligence, personal commitment, and responsibility for own decisions.

2. **Pedagogical Competencies**

    This type of qualities can be acquired during the teacher training course. It can be regarded as the contents of a teacher's apprenticeship. First, a teacher must be able to choose the correct and most important topics of a trade. Not everything can be learnt within the period of training. The second step is to group these topics into logical units and prepare proper lessons with it. Planning and running a lesson require competencies in the whole field of teaching techniques. He should be able to transfer theoretical knowledge as well as practical skills.

3. Professional Competencies

These abilities include the professional skills. A teacher should have acquired them during his own apprenticeship as a craftsman and his working experience. He/she must be a master of his/her trade. To be a master does mean being a model. It is not enough to be a craftsman but a good craftsman. A Teacher should always keep his/her eyes open for changes and developments in his/her trade. Teachers should always be up-to-date and interested in further training and upgrading. It is very necessary to have a wide range of general knowledge too. In a bid to develop a didactic concept based on occupational performance competence, Nanga (2007) classifies the concept under three sub components: (discipline-related technical competence), which includes the skills and readiness to accomplish given tasks independently and correctly using suitable knowledge and methods, and to be able to evaluate the outcomes; (personality competence) referring to the skills and readiness to think over and analyse development chances in the profession, family and in public life, to judge one's own talents to realize them and finally, to set up a life plan for further development; and (Social competence) referring to the skills and readiness to interact and communicate effectively with others irrespective of their age, sex, educational level, background etc. Other competences such as language competence and methodical competence spread through the three categories. The field-related competence is based on the knowledge, abilities and skills needed to carry out tasks in a particular job. These include facts and purposefully job-oriented elementary knowledge that need constant updating to keep pace with the changes on the job. Methodic competence on the other hand refers to procedural competence needed in carrying out tasks. It involves the ability and skills in using suitable means to resolve problems, skills to work independently and to transfer experience gained in similar instances. Social competencies are more oriented to societal values and personal behaviours. They relate to the ability and skills to communicate and cooperate with others. Social competences will also mean that workers cultivate the habit of self-critic and responsibility as motivational factors for his actions (Nanga, 2007). The

conference of ministries of cultural affairs (KMK) (2004, p 7-13) in Germany proposed more practical competences for TVET teacher, these are:

- Coordination of subject science and subject didactic knowledge and arguments in the planning, organization and execution of vocational lessons using appropriate methods, and the evaluation process.

- Constantly developing skills and integration of new ICTs in the didactic design of lessons.

While Doherty, et. al, 2019, p. 18-19 described that, competency of TVET facilitator constitute a crucial factor in determining the success of implementing innovative pedagogy in technical and vocational education. Competence is defined as what individuals know or can do in terms of knowledge, skills, and attitude. TVET facilitators need a wide range of competencies to effectively implement innovative pedagogies in their teaching practices. This is because TVET facilitators need to attract student interests and attention in new ways which necessitate the adoption of innovative pedagogical approaches in teaching and learning of technical and vocational education. Innovative teaching competencies should be nurtured and properly developed. Hence, TVET facilitators' competency for innovative teaching is a key influencing factor not only for the adoption of innovative teaching but also in determining its performance effectiveness.

1. **Personal competencies** - Instructors are not born as instructors, they must be trained. Some people might have a particular talent for teaching, but most people do not. However, teaching can be learnt. A major prerequisite for this is that a person wants to teach. Someone who has no urge to teach can never be a good facilitator. Apart from abilities that can be trained, a teacher should have some character capabilities. Some instructors have a well-balanced personality. This will help trainees to build up confidence in the instructor and lead to a good mood in the classroom. He/she should have natural authority and be able to guide young people.

2. **Pedagogical Competencies** - First a facilitator must be able to choose the correct and most important topics of a trade. Not everything can be learnt within the period of training. The second step is to group these topics into logical units and prepare proper lessons with it. Planning and running a lesson require

competencies in the whole field of teaching techniques. He should be able to transfer theoretical knowledge as well as practical skills.

3. **Professional Competencies** - A facilitator should always keep his/her eyes open for changes and developments in his/her trade. Instructors should always be up-to-date and interested in further training and upgrading.

4. **Social competence** refers to the skills and readiness to interact and communicate effectively with others irrespective of their age, sex, educational level, background, among others.

5. **Industry engagement** is also referred to as partnerships, employer engagement and more broadly as community engagement. Whatever the term used, industry engagement for TVET is concerned with communication and the relationship between key groups to ensure training activities meet the needs of the employers and the economy. Whilst not a new concept, workforce development is emerging as a priority approach for supporting labour market development and thus it is having a growing impact on the TVET sector and the sector's engagement with industry. Engagement can occur in several ways depending on the degree of interaction and involvement a TVET provider wishes to have with its stakeholders. Providers must decide on the way they wish to engage with their stakeholders to ensure mutual benefits for all. There are many benefits that flow from the effective industry engagement to the providers, students, business, industry, and economy. This industry competency can be a combination of many different types of up skilling activities. These may include:

- Working in relevant industry
- Industry placements
- Association memberships
- Participation in Industry Advisory Panels
- Gaining knowledge from guest speakers or industry experts
- Conducting/attending field trips or site visits to relevant workplaces
- Conducting research on industry trends and emerging technologies
- (Websites, newsletters, periodicals, supplier information)
- Attending industry training or roadshows

3.3 Initial Education and Training of TVET Teacher

In every country the need for competent workers is very urgent at this time and in some countries vocational institutions are unable to answer this challenge as expressed by ILO (2015, p. xiii) by In light of the job crisis and skills mismatch between labour market needs and training provided by general and vocational education systems in many countries, it has become widely recognized that TVET provision is an important, even growing, part of national education systems and any skills development agenda. At the same time, the capacity of the TVET sector to adequately prepare skilled workers through the provision of relevant skills development programmes of high-quality depends largely on the quality of its teachers and trainers, and, by extension, the quality of its teacher training programmes. Given existing teacher shortages within the field of TVET, it is imperative to take a critical view of current TVET teacher training programmes and identify the challenges therein, including (ILO, 2015, p. xiii):

- Lack of structure and relevance to ensure that TVET is recognized as a potential career path and that teachers and trainers are adequately prepared to share these skills with young people.

- Lack of responsiveness and inclusion to ensure that TVET teacher training programmes are not limiting the specific fields and opportunities available to instructors and the students they teach.

- Lack of innovation and progress to ensure that TVET teacher training programmes are constantly evolving and adapting to the latest advances in pedagogy and technology; and

- Lack of representation and communication to ensure that TVET teachers and trainers have an active voice and collegial support system to encourage them and enhance job satisfaction.

Conceptually, TVET teacher and instructor training is still seen in many countries as something that "people will do on the job". Very often there are no career paths for becoming a teacher or trainer in TVET and there are no clear stages of teacher training either (ILO, 2015, p. xiii). Pre- and in-service programmes for teachers and instructors are often not in place, creating difficulties for personnel to

function effectively without a training support framework in a sector that is highly dependent on innovations and is technology-driven (ILO, 2015, p. xiii).

Initial teacher education varies dramatically around the world in such aspects as institutional context, content areas, time allocation and forms of practical experiences for the students. Technical and vocational teachers in most countries usually work in technical and vocational training schools or centers and become specialists mainly because of higher education through university or university – related studies. In some cases, they may lack previous professional experience in the relevant sector (CEDEFOP, 1994).

3.3.1 Teacher Education and Training Practices in EU Contexts

According to Papier (2017, p. 45-46) The following section highlights practices in EU contexts that may be informative for emerging policy on TVET teacher development elsewhere.

- Flexible entry for industry professionals into TVET teaching. For example, in the Netherlands, colleges evaluate industry professionals who have minimal teaching competence, and they can commence teaching in the college while obtaining a pedagogical certificate. The advantage of this is that the recent workplace experience and expertise of the entry level teacher is utilised in the college, while building professional teaching competence as well.

- Colleges have more autonomy to appoint their own staff, thus colleges can attract the kind of expertise that they need without official delays or barriers to appointments.

- In Sweden, continuing professional development is available for in company trainers through online courses in pedagogy.

- Companies are incentivised to up-skill trainers, making teaching attractive, and these trainers could then become teachers in vocational colleges as well.

- In the Netherlands there is close cooperation between TVET teacher education and TVET schools, which enables the needs and expectations of both institutions to be considered.

- In Ireland new teachers are given mentoring and support by experienced colleagues, providing a bridge into their teaching career.
- In Finland vocational teachers are placed with employers in the workplace to enable continuous updating of teachers' industry knowledge.
- Denmark has an innovation fund for special projects which improve teachers' practices. Teachers are also viewed as change agents and are encouraged to reflect on their own practice.

In sum, these vignettes of international practices indicate an emphasis on strengthening industry involvement in TVET; on improving labor market information systems; on feedback loops between TVET colleges and teacher education providers; on continuing professional development for updating of TVET teacher's industry skills and competencies; and of giving TVET teachers some agency in their own education and in curriculum development at a policy level.

3.3.2 TVET Teacher Education and Training Curricula

Curriculum development in TVET Teacher education and training should be conduct in sustainability manner, in this context, Yunos, Sern and Hamdan (2019, p. 49) states that the purpose of a Teacher Education programme is to produce quality teachers, especially teachers that can perform the task of teaching effectively and deliver the purpose of the National Education Philosophy, consequently leading to a sustainable TVET Teacher Education programme. One aspect that contributes to the sustainability of a programme is the curriculum. The curriculum must be able to react with the changes took place in the workplace. TVET Teacher Education programmes require different criteria than general Teacher Education programme. More particularly, the highlighted these specific criteria for TVET Teacher Education Programme as follows (Yunos, Sern and Hamdan, 2019, p. 51) :

- specialization.
- work-based design.
- dynamic.
- interactive teaching and learning, and

- international syllabus.

Since each teacher's role is crucial in TVET, huge efforts have been made to develop training models and frameworks for teacher training in TVET. For example, the 'Core-Shell Model of TVET Teachers' Competences' developed by TT-TVET Consortium (2005) describes teachers' competences at three levels. At the core level the required competences are planning, conducting, and evaluating teaching lessons and instruction, providing occupation-related learning environments, materials and media, guidance and placement of students, and assessment of student's performance. At the shell level the required competences are demand- driven school-programme planning and organization, capacity building, curriculum development and evaluation, and school and facility management. At the framework level the required competences are providing demand-driven training offers, giving training-inputs for creating self-employment, and developing communication and cooperation networks (Dittrich 2009). Spöttll (2007) in his working paper 'Standards for TVET Teacher Training' and the TT-TVET Consortium (2005) cited by Haloader et al (2017, p. 2-3) present general standards for TVET teacher education covering six areas of development:

1. Standards for lecturers'/teacher trainers' activities (in TVET teacher education) as support for teachers' practice in TVET,
2. Standards for supporting students (trainee teachers) and their learning processes within TVET teacher education,
3. Standards for evaluation (of curricula) and assessment (of students' achievements),
4. Standards for developing curricula and learning contents,
5. Standards for developing methods for instruction and training, and
6. Standards for developing the organizational frameworks for learning environments.

Jailani et al. (2007) and Spöttll (2007) cited by Haolader et al (2017, p. 3) underline the following four dimensions of an occupational profile of a TVET teacher:

a. Competency in teaching and learning. The core tasks of a teacher are the target oriented and scientifically sound planning, organization and

reflection of teaching and learning processes as well as teachers' individual assessment and systemic evaluation.

b. Competency in assessment and counselling tasks. Advanced pedagogical, psychological, and diagnostic competencies of teachers are crucial for these tasks.

c. Self-development of teachers. Make use of further and continuous training offers to consider the new developments and scientific findings of their profession. In addition, teachers should establish and maintain contacts to external institutions and industries.

d. Awareness that the educational tasks at school are closely linked to instruction and school life.

Teachers participate in school development, in shaping a school culture suitable to enhance learning, and to create a motivating school climate. Soysouvanh et al. (2013, p.7) identified five competency areas of standards for vocational teachers at the Bachelor level:

- Competency Area of Acting in an exemplary manner.
- Competency Area of Educating.
- Competency Area of Teaching.
- Competency Area of Assessment.
- Competency Area of Self-Development and Innovation.

Each of these competency areas is subdivided into 16 specific competencies, which is illustrated by 80 indicators.

Bünning and Shilela, 2006, on their paper "The Bologna Declaration and Emerging Models of TVET Teacher Training in Germany", p. 14, described the influence of the Bologna Declaration on the development of new models in degree structures in TVET Teacher Training has resulted in a variety of approaches in German universities. An analysis of new structures implemented by German academic institutions reveals three emerging models, namely :

- The Consecutive Model.
- The Top-Up-Model.
- The Blended Model.

The Consecutive Model

The most dominant model appears to be the Consecutive Model. This model is very similar to the former single block programmes in that the three educational strands of major, minor, and vocational education/didactics are integral to both cycles of study (see figure below). An example of the Consecutive Model can be found at Berlin Technical University. Other Universities are considering this model as part of their portfolio e.g. Hannover University, Dresden University of Technology.
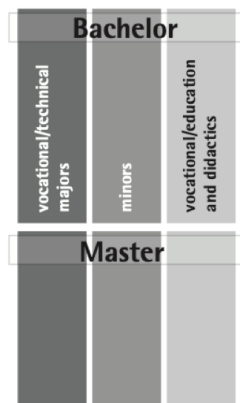
Characteristic:
- Major, minor, and vocational education/didactics are already integrated in the bachelor's program.
- Major and minor are continued at the master level.

Figure 3.4 Consecutive Model

Source : Bünning and Shilela, 2006, p. 15

The Top-up-Model

In contrast to the Consecutive Model, the Top-up-Model introduces just one strand of teacher training at the Bachelor's level. This element is normally the technical or vocational strand. In this model, other recognized aspects of teacher training such as didactics and minor subjects are only introduced at Master's level (see Figure below) This model has been in operation at Hannover University since 2003-04.
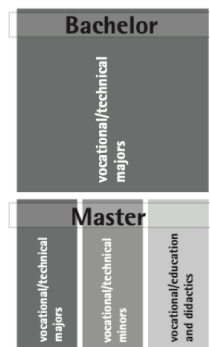
Characteristic:
- Master program builds up on a bachelor's degree (e.g. in a technical field).
- The major result from the field studied at bachelor's level.
- Minor, and vocational education/didactics are studied at master's level exclusively.
- Major is continued at master's level.

Figure 3.5 The Top-Up-Model

Source : Bünning and Shilela, 2006, p. 16

The Blended Model

The Blended Model offers a two-cycle degree system which introduces two strands of teacher training at Bachelor level, together with one module of vocational education and didactics which is open to students from other faculties. The Master's degree offers opportunities to deepen understanding of all three strands, see Figure below. This is an established model at Otto-von-Guericke University in Magdeburg (the Magdeburg Model).
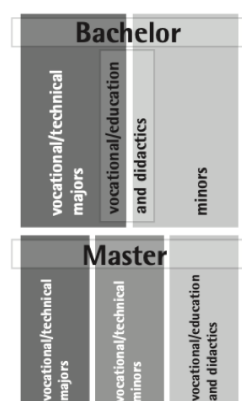
Characteristic:
- Studies at bachelor's level focus primarily the vocational/technical major, the minor is closely linked to the major.
- Vocational education/didactics is delivered in a separate module. This module is open for students from other faculties (e.g. engineering).
- Studies of major, minor, and vocational education/didactics are continued at master's level.

Figure 3.6 The Blended Model

Source : Bünning and Shilela, 2006, p. 17

In the context of Indonesia TVET Teacher training, Indonesia has developed National Competency Standards for teachers and lecturer through act number 14 of 2005, this act become the basis for development of Initial TVET teacher curricula in university.

The act states that Teachers is educator in a school both public and private schools who can educate based on the formal education background that has been taken. The teacher is in charge of educating, teaching, guiding, directing, training, evaluating, and evaluating students' education in early childhood education, through formal education, basic education and secondary education.

To create quality students, the teacher is required to master 4 competencies. Based on Act Number 14 of 2005 concerning Teachers and Lecturers, Article 10 paragraph (1) states that: "Teacher competency as referred to in Article 8 includes pedagogical competencies, personality competencies, social competencies, and professional competencies obtained through professional education", 4 Basic Teacher Competencies according to the Act, as follows:

1. **Pedagogic Competence**

Pedagogic competence is a competency that encourages teachers to have the ability to understand students, design, and implement learning, evaluate learning outcomes, and develop learners to actualize their various potentials. The following are sub-sub in pedagogic competencies:

- Understanding students in depth:

  Includes understanding of participants in the study by utilizing the principles of cognitive development, personality principles, and identifying students' initial learning provision.

- Designing learning:

  Includes an understanding of the foundation of education for the benefit of learning which includes understanding the foundation of education, applying learning, and learning theory, determining learning strategies based on student characteristics, competencies to be achieved, and teaching materials, and composing learning designs based on the chosen strategy.

- Carry out learning:

Including setting the setting (Setting) learning and implementing conducive learning.

- Design and carry out learning evaluations:

    This sub includes designing and carrying out continuous evaluation of processes and learning outcomes with various methods, analysing the results of evaluation of processes, and learning outcomes to determine mastery level, and utilizing the results of learning assessment to improve the quality of learning programs in general.

- Develop students to actualize their potential:

    Includes facilitating students to develop various academic potentials and facilitating students to develop various non-academic potentials.

2.   Personality Competence

Personality competency is a personal ability that reflects a stable, stable, mature personality and authority, the teacher becomes an example for students and has noble character. Sub-sub personality competencies include:

- Steady and stable personality:

    Namely the teacher always acts with social norms, is proud of the profession that is being undertaken, and is always consistent in acting according to the norm.

- Wisdom personality:

    Namely the teacher displays independence in acting as an educator and has a work ethic as a teacher.

    Namely the teacher displays actions based on the usefulness of students, schools, and shows openness in thinking and acting.

- Authoritative personality:

    Namely teachers who have behaviours that have a positive effect on students and are respected by students.

- Noble:

    Namely the teacher can be an example and have behaviour that is in accordance with religious norms.

3. **Professional Competence**

Professional competence is the ability possessed by the teacher about mastering learning material widely and deeply, it is one of the things that allows teachers to be able to guide students to meet the standards of competence and national standards of education. The following components are in professional competence.

- Mastering material, structure, concepts, and scholarly mindsets that support the lessons learned.

- Mastering the competency standards and basic competencies of subjects or fields of development that are capable of.

- Develop learning materials on an ongoing basis by carrying out reflective actions.

- Using Information Technology Communication to communicate and develop themselves.

4. **Social Competence**

In social competence requires teachers to have the ability to get along and communicate effectively with students, education staff, guardians of students and the surrounding community. Components of social competence include:

- Inclusive, acting objectively and not discriminatory because of consideration of gender, religion, race, family background and social status.

- Communicate effectively, empathically, and politely with fellow educators, education staff, parents, and the community.

- Adapt where teachers are assigned throughout the Republic of Indonesia that has a diversity of socio-cultural.

- Communicate verbally or in writing.

Furthermore, a compulsory unit of competencies from the Generic Area (GA) which applies occupational safety and health practice in the workplaces recommended for TVET teachers. The above-mentioned training standards cover the 'vocational pedagogy' component of the Lipsmeier's (2013, p. 8-12) 'consecutive model' of teacher training. The first level of teacher training may not necessarily be a bachelor's degree. Instead, the teacher may acquire a certified trade or technical qualification that is at one level above which training will be delivered

and/or assessed by the teacher/trainer. In response to the challenges facing TVET systems and their staff, as well as their initial and further preparation for evolving roles, an effort is made below to set out some criteria for excellence – what some might term "good" teachers – as a prerequisite for defining the necessary training and qualification system that responds to such objectives. Bearing in mind that such criteria cannot be overly prescriptive nor considered exclusive in view of the great diversity of country systems and the complexity of needs, "good" teachers and trainers may be understood as those who meet a certain number of professional criteria (ILO, 2000, p. 34; Nielsen, 2007, p.. 57), tangible and intangible, including:

- extensive knowledge in one or more subjects or fields of learning.
- a high degree of functionality in information and communication technology (ICT) and technological processes.
- general understanding and ability to share larger economic and social realities with students.
- capacity to impart generic learning skills to students through their instruction and organization of learning processes.
- ability to function collaboratively in a team.
- research, reflection and change as necessary in teaching practice (teacher as learner).
- ability to communicate and empathize with students; capacity to innovate and impart innovation in learning.

Very recently a working paper of the ILO (2015, p. 11) described, depending on the national TVET context, teachers and trainers will have gone through a number of different stages of training and have developed skills that can be measured both quantitatively and qualitatively. Identified stages that should be requirements for TVET teachers and trainers include:

- initial university, post-secondary, or tertiary studies from one to three years on average.
- non-academic industry and/or service work experience of varying duration.
- pre-service teacher training in addition to disciplinary studies.
- ongoing in-service teacher training CPD.

These different stages in teacher training might be done in various combinations, although non-academic work or industry/service work is increasingly considered an essential component of TVET preparation, as is some grounding in pre-service pedagogical training and lifelong access to CPD following concepts of lifelong learning for all and the crucial need for TVET teachers to renew their skills set during their teaching career (ILO, 2015, p. 11). ILO (2015) also proposed an analytical tool for assessing TVET teacher training systems. This tool includes four essential dimensions (also called pillars) that comprise a successful teacher training system which include structure and relevance; responsiveness and inclusion; innovation and progress; and representation and communication. These pillars consist of 12 key elements of teacher training (Figure below), "which, if appropriately addressed, would supply teachers and trainers with the skills necessary to be classroom leaders, innovative pedagogues, partners in policy reform, and adaptive curricula designers and implementers".
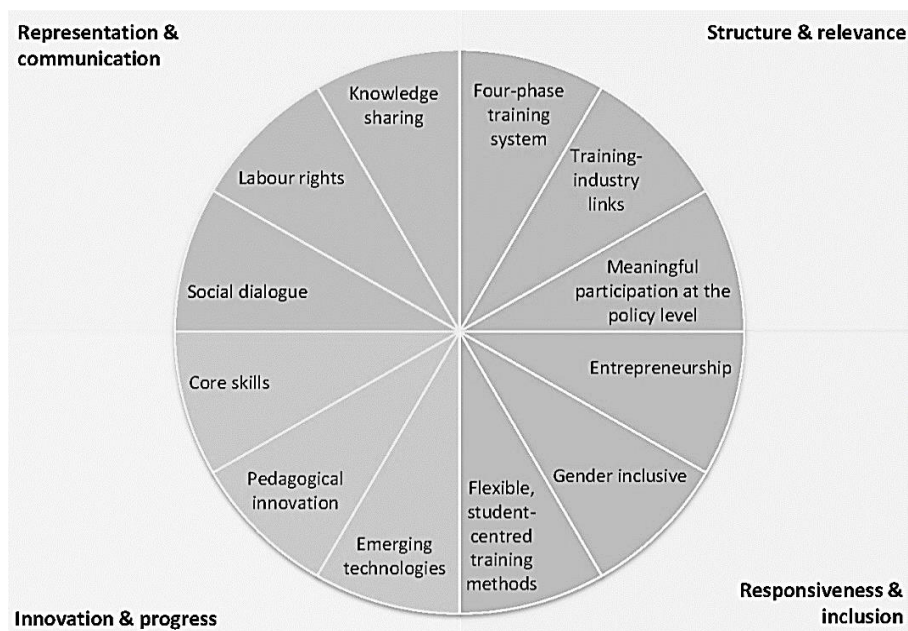
Figure 3.7 Pillars of Initial Teacher Training

Source: ILO. 2015, p. 13

Pillar one: Structure and relevance (ILO, 2015, p. 12-14)

Effective teacher training systems are those that have a meaningful structure which includes different distinct stages of teacher preparation, those that train recruits according to good practice and in ways coherent with local contexts. This paper advocates for a system approach that incorporates both pedagogical and technical components throughout a four- phase training system that includes both initial and continued training components for teachers and trainers. In addition, both high quality and relevance are indispensable characteristics of contemporary teacher training systems.

- Key element one: Providing a four-phase training system for teachers and trainers
- Key element two: Setting up close linkages between training and industry
- Key element three: Ensuring meaningful participation of teachers and trainers at the policy level in TVET system design and reform

Pillar two: Responsiveness and inclusion (ILO, 2015, p. 15-16)

Teacher training systems need to build the entrepreneurial capacities of teachers and guarantee inclusive teacher training systems. Students in TVET systems are not identical or replaceable widgets on a linear production line of learning; they are, rather, dynamic individuals with diverse needs and backgrounds. As such, teachers and trainers need to adopt differentiated teaching strategies and inclusive programmes that respond to unique student needs and a variety of employment tracks, including the option of entrepreneurship. Moreover, these actions are necessary to extend educational and social rights to all persons, including those with disabilities.

- Key element four: Integrating entrepreneurship education into training
- Key element five: Designing gender-balanced and inclusive programmes
- Key element six: Employing flexible, student-centered training methods to address learning needs of diverse individuals

Pillar three: Innovation and progress (ILO, 2015, p. 16-18)

In order to remain relevant to market demand and technological changes, teacher- training systems should incorporate innovative practices, both in course content and instructional pedagogy, into existing programmes. Teachers must be

exposed to and trained to utilize emerging technologies in the classroom through systematic and continuing professional development (CPD). In addition, the concept of innovation should extend to pedagogical practices in the classroom; teachers and trainers should be encouraged and supported as they incorporate innovative instructional methods to meet the needs of trainees and integrate emerging technologies into curricula in new ways. Innovative partnerships between training institutions and industry are also key mechanisms for acquiring practical knowledge and experience.

- Key element seven: Adapting to emerging technologies and innovations in the workplace
- Key element eight: Integrating pedagogical innovations in skills development
- Key element nine: Focusing on core skills of teachers and trainers

Pillar four: Representation and communication (ILO, 2015, p. 19-21)

Social dialogue is a central tenet of the ILO and is essential for establishing educational policies and practices that meet the needs and concerns of all stakeholders. It is a positive means by which to develop collaborative solutions to common problems and issues relevant to conditions of work and, by definition, engenders cooperative working relationships between diverse groups of actors. Social dialogue, as conceptualized by the ILO, is understood to mean all forms of information sharing, consultation, and negotiation between educational authorities, public and private, and teachers and their democratically elected representative in teachers' organizations (ILO, 2003, p. 1).

- Key element ten: Establishing venues for dialogue among social partners 'on' and 'in' teacher training
- Key element eleven: Raising awareness among teachers and trainers about labour market inequalities and their own labour rights
- Key element twelve: Developing networks for knowledge-sharing among teachers and trainers

Majumdar (2011a, p. 9) described that in order to develop effective curriculum, teachers must be curriculum leaders. Ensuring that teachers are central to the reformation of curriculum will enable the development of pedagogy that provides

the most favourable condition of learning and the highest quality learning outcomes for all students. The major changes in curricula are as follows:

Table 3.1 Major Changes in Curricula

From	To
Memorizing Facts	Inquiry Based
Artificial Teaching Exercises	Authentic Learning
Rigid Delivery (Fixed Time & Space)	Open & Flexible Delivery (Any Time & Anywhere)
Single Path Progression	Multi Path Progression
Traditional Based	Competency Based

Source: Data from Majumdar, 2011a, p. 9

3.3.3 Learning Process

Every learning process in vocational education institutions refers to the goal of preparing students according to the demands of the world of work, in this case the demand for vocational teachers who have high standards is expected to be achieved by the learning process carried out at the vocational faculty. To achieve the set targets, vocational education carries out a theoretical and practical learning process. Sink (2014, p. 190) remind us that cognitive theory will assist the learner to obtain the thinking techniques to improve performance in the job. Harasim (2017, p. 3) pointed out that theory is an explanation of why things happen or how things happen. She defines learning theory as a theory designed to help us understand how knowledge is created and how people learn. Meanwhile Lefrançois (2019, p. 9) writes that learning a theory aims to systematize and organize knowledge about human learning. He believes that powerful learning theories are designed to explain behaviour, predict behaviour, and even shape or change learner behaviour. Kyarizi (2016, p. 6) remind us that, in Vocational education, however, knowledge cannot be viewed in the same way as verbalizing explanations of what a vocation consists instead it should be viewed as being an integration of contextual, theoretical (conceptual, procedural, and propositional), practical, and indigenous everyday knowledge. This is because to be a competent craftsman, a person needs to use all

forms of knowledge that relate to his or her vocation in the context in which it is applied. In today's modern world, vocational education has embraced the concept of learner-centered education. This is expected to direct the learning process into an activity that can further explore the abilities of learners in school. In its implementation, the vocational teacher plays a more role as a facilitator in the learning process. For many teachers, moving towards learner centred approaches means they must leave the centre stage to become the creator of a learning environment that gives multiple opportunities for learners to learn. In this context, Doherty, et. al (2019, p. 10-11) states that to effectively achieve the quality assurance of learning outcomes, the best methods should be adopted to promote the learning of technical and vocational education and training in a technologically enhanced environment. Good teaching methods can make the subject content easier to understand and apply, while improper methods can impair the understanding and application of certain topics or topics. Therefore, the conscious effort of TVET instructors in using appropriate vocational pedagogy to encourage meaningful learning should not be underestimated. In view of this, the pedagogy is consciously designed by the facilitator of learning and aims to bring students effective learning in any activity. The purpose of designing pedagogy is to stimulate students' enthusiasm, and the result is to make students' journey in the working world successful and productive. Therefore, this emphasizes the importance of adopting active pedagogy by establishing a beneficial, sustainable, and fair learning environment (using a learner-centered approach), which will encourage learners to control their own learning. Therefore, one of the ways to achieve this goal is to adopt and utilize innovative promotion methods. Innovative pedagogy is a learning method that defines how learners absorb, generate, and use knowledge, skills, and attitudes, so that learners have relevant knowledge to play a role in local, national, and global socio-economic environments. For example, an innovative TVET teaching method can help respond to new demands, lack of materials and equipment, lack of direct motivation, lack of stability, increased workload, and new terminology. For any type of innovative teaching method to be designed and used, it is necessary to obtain the support and facilitator's commitment from the composing authority (such as the school principal). Therefore, innovative teaching

methods mean applying existing teaching methods in an innovative but value-added way. Innovation refers to doing things in new or different ways, which is essential for continuous improvement of training and providing higher learning outcomes, fairness, cost efficiency and student satisfaction. Students are increasingly seeking training that can meet their individual needs. This provides a great opportunity for trainers to be innovative by making learning environments more exciting, challenging, and rewarding. Trainers can be more innovative by:

- Embracing new technologies to transform training
- Implementing new and improved training and assessment strategies
- Rethinking of educational goals
- Learning from other innovators in training and education

There is obvious evidence that vocational education needs to be carried out in the context of solving practical problems, and high-quality vocational education almost always involves multiple methods. The best vocational education learning is broadly hands-on, practical, experiential, real and with feedback, questioning, application, and reflection, as well as providing theoretical models and explanations when needed, and often at the same time (Lucas et al, 2012, p. 9). In the context of vocational education, the theoretical learning process provided is in the form of actual problem-solving efforts. In the implementation process, the learning methods used vary greatly, and one method cannot be used. In this case, the method is always a combination of several existing methods based on learning objectives. The learning process of vocational education will take the form of direct practice, work experience, practice in the real world and repeated practical demonstrations. This is done to equip students with the ability to follow the predetermined goals. Therefore, vocational teachers are required to have the ability to conduct a good theoretical learning process to provide students with correct information so that these students can practice in accordance with the established procedures. Based on the data obtained from the respondents above, it is stated that the intern teachers have good teaching skills in the theoretical class, with the various methods used they can do their job well, especially in basic vocational subjects. These abilities prove that they have been able to act as vocational teachers in the future. However, the data also shows that some of them still lack theoretical knowledge in certain

subjects, as conveyed by the respondent TVS-02 and TVS-04, they stated that for advanced electronics subjects in the refrigeration study program they did not have sufficient competence. This is an important finding to know as a basis for making the necessary improvements. These shortcomings can be influenced by several variables such as: curriculum, volume of learning at the university, practical activities, and evaluations carried out by the university towards graduates.

Lucas et al (2012, p. 10) explained the list below is indicative of those vocational learning methods which, we believe, have considerable value. They are relatively well understood and used in a range of contexts internationally. The majority are broadly 'learning by doing' or 'experiential', though many combine reflection, feedback, and theory.

- Learning by watching
- Learning by imitating
- Learning by practising ('trial and error')
- Learning through feedback
- Learning through conversation
- Learning by teaching and helping
- Learning by real-world problem-solving
- Learning through enquiry
- Learning by listening, transcribing, and remembering
- Learning by drafting and sketching
- Learning on the fly
- Learning by being coached
- Learning by competing
- Learning through virtual environments
- Learning through simulation and role play
- Learning through games

While Spottl, 2009, in his paper "Teacher Education for TVET in Europe and Asia: The Comprehensive Requirements" described the guidelines for Teacher Training in TVET, namely:

1. It is necessary to develop standards for teacher training which describe the required competencies to be acquired during the study course. The study

course must be linked to practical training phases. The teacher training must be shaped in a competency-oriented way. To reliably coordinate this requirement, the performance of the partner institutes participating in teacher training must be fine-tuned.

2. The quality of teacher training exerts a major influence on the quality of the young persons to be trained and on the sound development of democratic societies. It is therefore recommended to implement the teacher training at universities by all means. The teacher profiles must not be determined to narrowly. They must not only concentrate on instruction but must focus on the development of schools as a whole and must concentrate on the industrial challenges as contents of training.

3. During the teacher training for TVET the following statements must be realized:

- The studies and/or the internal structure of the studies must be safeguarded by linking specialized scientific, specialized didactical, pedagogical scientific and social scientific as well as school practical training elements.

- The training must be differentiated according to the various kinds of teachers (e.g. for primary level, secondary level, vocational training etc.).

- The teacher training shall be integrated in academic Bachelor and Master studies.

- The scientific character of teacher training must be ensured. The training must include the ability to carry through scientific studies such as research on training and empirical instruction.

- The professionalism of teacher training must be underpinned by standards for specialized didactics, the specialized sciences (= vocational sciences) and educational sciences.

- Guidelines for the profession of a teacher are to be formulated.

- The polyvalent character of teacher training must be ensured.

- The role of the state must be clarified and the way the state takes over the responsibility for the quality of teacher training and of the respective accreditation processes.

- New forms of teaching and learning for teacher training must be developed.

- Universities ensure the competency for entering an occupation, i.e. the first step of a long-term process of the development of the ability to work in an occupation, professionalization and the regular further training of the staff which must be supported by the schools.

3.3.3.1 Teachers and Learners in 21st Century

A learning process will be carried out effectively if the information provided can be received and understood well by students, in this case the learning process must always adjust to the characteristics of students from time to time. There is at least one generation gap between Learners and the Teachers. It is also important to recognize that the 21st century learners are indeed very different from what we were as students (Majumdar, 2011b, p. 49). There Are major difference between four recent generations: The Matures (1900-1946); the Baby Boomers (1946-1964); Generation X (1964-1982); and Generation Y or Generation Net (1982-present). Over a period of a century, the teaching style has undergone a transformation from lecture, primarily verbal, and rote, for matures, to interactive, even in large classes, and problem-based with feedback via clickers and online software, for generation Y; and the Learning style from memorize, try again and again, for matures, to simulations, frequent interaction with faculty and peers, and open-ended, for generation Y (Majumdar, 2011b, p. 49). Regarding to the rapid changes in learning, Majumdar, 2011 described the several table about those changes, as follows:

Table 3.2 Changes in Teaching-Learning Environment

Model	Focus	Role of learner	Technology
Traditional	Teachers	Passive	Chalk and talk
Information	Learners	Active	Personal computer
Knowledge	Group	Adaptive	Pc + Network

Source: data Majumdar, 2011b, p. 50

Table 3.3 Changes in Teachers' Roles

From	To
Transmitter of knowledge	Guide & facilitator of knowledge
Controller of Learning	Creator of Learning Environment

Always Expert	Collaborator & Co-learner
Learning to use ICT	Using ICT to enhance Learning
Didactive/Explanatory	Interactive/Experimental/Exploratory

Source: data Majumdar, 2011b, p. 50

Table 3.4 Changes in Learners' Roles

From	To
Passive Learner	Active Learner
Reproducer of knowledge	Producer of Knowledge
Dependent Learner	Autonomous Learner
Solitary Learner	Collaborative Learner
Solely Learning Content	Learning to learn/Think/Create & Communicate

Source: data Majumdar, 2011b, p. 51

Table 3.5 Changes in Curricula & delivery

From	To
Memorizing facts	Inquiry based
Artificial Teaching Exercises	Authentic Learning
Rigid delivery (fixed time & space)	Open & flexible delivery (any time & anywhere)
Single path progression	Multi path progression
Traditional Based	Competency Based

Source: data Majumdar, 2011b, p. 51

Integrating innovative pedagogical approaches implies that the roles of teacher and student from a more traditional setting, will become that of facilitator and learner in the 21st century learning environment. (See Tables 3.6 and 3.7) This is essential in outcome-based education. The aim of the 21st century facilitation of learning is to support learners in establishing lifelong learning habits, an ability to learn with technology, the development of knowledge, character, and higher-order skills (such as creativity, critical thinking, communication, collaboration). Implementation of an innovative pedagogical approach will impact on teachers/facilitators, learners, and the learning environment. It is important that the teachers have a clear mental picture of their responsibilities as facilitators. After all,

the quality of the TVET education system cannot exceed the quality of its facilitators/teachers (Doherty, *et. al*, 2019, p. 12).

Table 3.6 Comparing Classic Teachers' Role and 21st Century Facilitators' Role

Classic Teacher	21st century facilitators'
The teacher is in control, main concern is the class of learners as a whole	The facilitator provides varied and rich learning opportunities, monitoring individual learners
Covers the syllabus in little but fixed steps. Focus on 'getting through the syllabus'	Makes sure that each learner is actively engaged in learning the purpose of achieving Learning Outcomes
Plan steps in fixed sequential order	Maximises flexibility and variation in the learning environment and process
Makes sure everyone listens. Strict classroom control, discipline enforced.	Process manager, facilitator of learning, creating for all learners to learn
Content expert/dispenser of information / sage on the stage	Interpreter and designer of learning programmes and materials
Lecturer / transmission model	Engage learners. Facilitator of learning Learning mediator
Control – get through syllabus regardless of what learners know and can do already	Use a range of learning resources in in different media [print/audio-visual, visual, e-based] Technology enhanced training.
Whole class approach	Facilitator's plan, design and implement a learning programme in collaboration with each other [teamwork, team teaching], community partners, and students
	A unique learning plan in develop for every student based on students' interest, learning styles, and real-times data

Source: Doherty, *et. al,* 2019, p. 12

Table 3.7 Classic Learners' Role Compared with Learners' Roles In 21st Century

Classic	21st century facilitators'
Whole class approach	Focus on understanding, application, process, transferable skills
Follows instruction from teacher	Control own learning process
Dependent learner	Independent learner
Dependent learner	Independent learner
Passive listening	Actively constructing knowledge / skill
Uncertainty as to what tests/ exams will cover (only selective parts of syllabus are tested)	Know exactly what will be asked in the test/ what will be looked for in performance as All Learning Outcome/Performance Criteria will be covered
Writing test/exams, performing, producing a product without knowing how marking/assessment will be done	Prior test/ performance or product assessment the criteria for assessment are made available and discussed
Rarely is allowed to see final exam / test after being marked	Get full insight in how assessment was done, and a decision taken (competent / not yet competent)

Source : Doherty, *et. al,* 2019, p. 13

The 21st-century approach is learner centered and activity-based. The different methods or approaches a facilitator can use in facilitation outlined herein are cooperative learning, experiential learning, individualized learning, and facilitator guided whole class facilitation. In implementing an innovative pedagogy approach in a 21st century implies that the role of a teacher will change to a facilitator which indicates a shift from a teacher-centered to a learner-centered approach to learning as shown in Figure 3. There is a wide range of facilitation methods that can be classified in different ways. Any instructional method used in facilitation of learning with learners has advantages, disadvantages, and requires thoughtful planning (Doherty, et. al, 2019, p. 20).
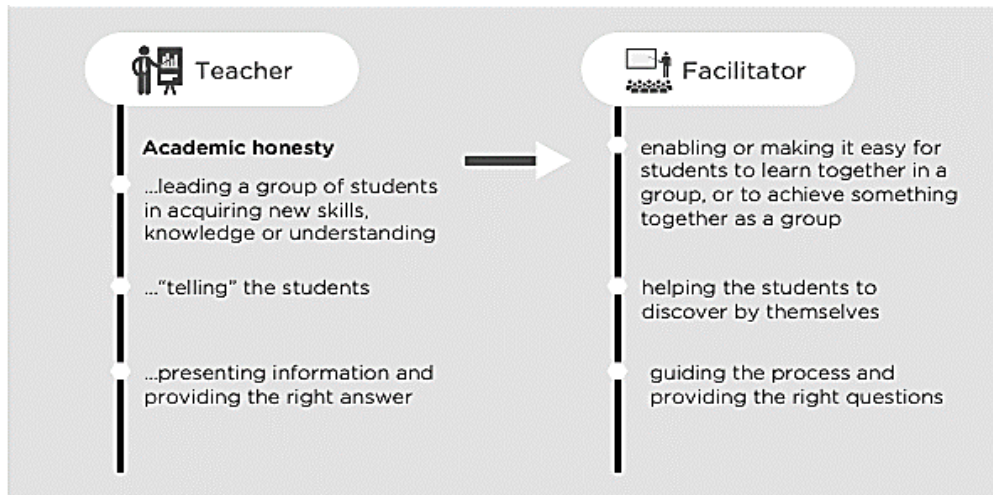
Figure 3.8 From Teacher to Facilitator

Source: Doherty, et. al, 2019, p. 20

For achieving the target set to prepare students for become a TVET Teacher, lecturer at university need proper lesson plan to conduct an effective classroom whether in theory or practical learning process. In this context, Doherty, et. al, 2019, p. 13-14 described the lesson plan for innovative pedagogy approach in a 21st century and in an outcome-based education will focus on two main aspects :

- The session plan must be learner centred, inclusive and learner friendly
- The session plan must embed whenever possible, 21st century skills

For many teachers, moving towards learner centred approaches means they must leave the centre stage to become the creator of a learning environment that gives multiple opportunities for learners to learn. Most of the work is done before facilitating the session, to set the stage for the learning and assessment tasks teachers have developed for the session. Therefore, the purpose of a session plan is to align all learning and assessment activities to the learning outcomes for each lesson, and to ensure that learners achieve said learning outcomes. A session plan is like a road map that helps facilitators to stay on the track. It is a pathway that leads to the set destination (learning outcomes). A session plan is a planning document that gives a facilitator room to deviate, as unplanned events during the session might necessitate this. A facilitator should remain flexible and bear in mind that educating learners is the most important thing, not the plan. Facilitators must avoid situations that will prompt a rush to complete the planned session, as this is

counterproductive. With clearly defined learning outcomes, the facilitators can describe what will be achieved in the learning process (as shown in Figure 1), and state what the learners can do at the end of the session. Learning outcomes give learners an idea of what the purpose of that session is. It also gives the facilitator practical direction, as it determines the structure of the session, facilitation method, and the mode of assessment to use (Doherty, *et. al*, 2019, p. 14).
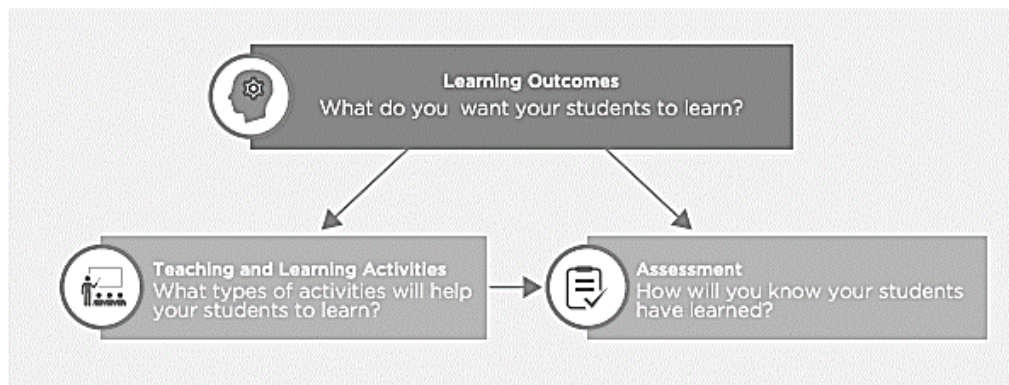
Figure 3.9 Learning Outcomes

Source: Doherty, et. al, 2019, p. 14

3.3.3.2 Practical Learning Process

One of the practical learning concepts that are commonly practiced in Indonesia is Competency Based Training (CBT), ILO (2020, p. 12) state that CBT is a structured training and assessment approach that allows individuals to acquire the skills and knowledge to perform simple or complex tasks to a specified standard. CBT is focused on:

(1) the performance of tasks and duties by an individual.

(2) the conditions in which they are to perform these tasks and duties; and

(3) the standard to which they are to perform.

CBT is an outcome-based learning system for developing curricula. Training and assessment are centred around learners achieving certain competencies according to clearly defined criteria and undertaken within workplace-like conditions. CBT is, therefore, a form of training that is specifically focused on achieving competence. Training is typically divided into small units that

are dedicated to the mastery of a specific competency and articulated together into more complex structures. Once students can demonstrate the mastery of a given competency, they then proceed to the next unit. Instead, CBT attempts to be market-relevant, since it is based on information about the needs of the labour market and, in return, signals to employers the available skills and employability of jobseekers (ILO, 2020, p. 13).

The link between theory and praxis has often been identified as a possible weakness in the traditional system of TVET Teacher Training (Nielsen, 2002) and one of the aims of the Bologna Declaration was to strengthen the practical elements of TVET Teacher Training through the restructuring exercise. In this respect the reforms were welcomed as an opportunity to plan programmes with a strengthened element of practical training. Although this was a hoped for 'by product' the three emerging models do not demonstrate evidence of a strategic approach to restructuring which would ensure the inclusion of more intensive periods or stronger links with practical training. Since all bachelor's and master's programmes have traditionally included a practical element it has been difficult to envisage how this might be strengthened (Schulz, 2004). Schulz raises the question of the feasibility of a one-year probationary period. This approach would simultaneously achieve two goals of Bologna by shortening the study period and strengthening the practical elements of TVET Teacher Training (Bünning and Shilela, 2006, p. 23). There is a growing interest in practice-based learning in countries with both advanced and developing economies. Much of this interest is directed towards augmenting students' learning within vocational or higher education programmes of initial occupational preparation or those for professional development (i.e., further development of occupational knowledge across working life). The worth of contributions from practice settings and experiences with authentic instances of occupational practice, of course, has been long acknowledged in the major professions and trades. Indeed, most trades and professions have a requirement for individuals to engage in an extensive period of practice prior to being accepted as a tradesperson or professional. So, there is now a growing interest in occupationally specific higher education programmes providing these kinds of experiences for novice practitioners. However, beyond their use in initial occupational preparation,

there is a wider set of considerations about the utility of practice-based experiences to promote ongoing development across working life. In particular, occupational practice and experiences in practice settings are now being used as a vehicle for professional development. Increasingly, educational programmes organised by universities, technical colleges, and professional bodies, are often either premised upon or partially based within the learner's occupational practice. Hence, at this time, there is a wide and growing acceptance that the experiences provided in practice settings, usually workplaces or work settings, are essential for developing the knowledge required to effectively practice occupations (Billett, 2010, p. 1) . Effective knowing and learning for vocational purposes must take account of the wide range of variables that impact knowledge formation, and which therefore promote learning. We contend that effective vocational learning comprises two equally important dimensions: (a) learning as the acquisition of vocational knowledge and (b) learning as the contextualized (socio-political and cultural) application of that knowledge. In the case of knowledge acquisition, the extent to which the socio-political and cultural factors in which the knowledge is acquired are different from those when the knowledge is applied can lead to a lack of effective and efficient application. For instance, in the example of classroom-based vocational learning, where the knowledge is applied elsewhere, in, say, a workplace, recontextualization of knowledge is necessary. In the case of vocational knowledge application, a set of situated factors come into play which are particular to the workplace or other situations where the knowledge is to be applied. Understanding these differences and the situated factors influencing effective TVET learning helps tease out the nature of 'effectiveness' (Catts *et. al,* 2011, p. 7). The importance of innovative vocational learning (whether systemically or non-systemically acquired), of a recognition of the role of social networks and enhanced self-confidence, together with effective knowledge acquisition and management supported by appropriate curriculum design and pedagogy, has been emphasized in many of the contributions in this book. Most effective adult learners become self-directed in their approaches to vocational learning and employ learning strategies that reflect their lifelong circumstances. For example, if they are working, they may prefer collegial learning experiences in which their peers are as important as their

educators – in fact, their peers may be their main or, in informal contexts, their only mentors. Likewise, those who are not in the workforce seeking to acquire vocational skills can benefit from building a supportive and bonded social capital within a learning group, as well as from accessing opportunities for progression utilizing linking and bridging social capital provided by tutors (Catts et. al, 2011, P. 7).

In practical learning process vocational trainer should carry out a demonstration to transfer skill to students, in this context, Doherty et. al, 2019, p. 23-24 described that a teaching method used to communicate a skill with the aid of audio, visuals, or audio-visuals such as flip charts, posters, power point slides, real objects [e.g. making a dovetail joint, folding a napkin in bishop mitre shape], video clips, or through role / life display [e.g. demonstrating how to greet a person at a front desk, how to stand / speak when giving a presentation], etc. A demonstration session is the process of facilitating the learning of a skills in a step-by-step process. This may involve showing by reason or proof, explaining, or making clear examples or experiments. Demonstration method improves the understanding of complex skills and principles because the learners can pay attention to and follow along with the learning process. This method need not be facilitator demonstration, it can be invited expert, can be learners in experiential learning cycle; 'demonstration' can also – and often better – be 'video demonstration' following the demonstration on a video clip, visible to all learners. It can be stopped, replayed, allows close ups etc. Figure 3.11 highlights the pros and cons of the demonstration method This method is best used when:

- Teaching technique, procedure, or operation to a small group of learners.
- There is need to develop student ability to operate equipment or acquire physical skills. Topics like how to "make pastry', catering, electrical or computer craft subjects can be taught using this method.

Brief description of method / guidelines:

Three main steps involved in using demonstration method as shown in Figure 5 are show and tell, repetition and performance.

Step One:
Show and Tell.

Position the students and training aids properly. Make sure that everyone has an unobstructed view. Show and explain the operations in step-by-step order. Say what you are doing as you perform the demonstration either real or video demonstration. Ensure students understand each step before proceeding to the next step. Repeat difficult operations. Pause briefly after each operation to observe reactions and to check for understanding. Ask questions during the demonstration that require the students to recall

Step Two:
Repetition

Generally, there is a need for the inclusion of one or more repetition steps between the demonstration step and the performance step.

Step Three:
Performance

The third stage is the step in which the students practice under supervision until they have attained the required proficiency. During this step, they apply what they have previously learned as a result of the demonstrations.

Figure 3.10 Demonstration Method Descriptions

Source: Doherty et. al, 2019, p. 24

Advantages	Disadvantages
Improves the understanding of complex skills and principles.	Extra preparation time for facilitator to 'rehearse' the demonstration
Students can pay their attention and follow along with the learning process.	Needs special arrangement to ensure ALL learner can see / follow the demonstration
Knowledge becomes permanent because this method requires different human senses.	

Figure 3.11 Advantages and Disadvantages of Demonstration Method

Source: Doherty et. al, 2019, p. 25

To measure the success of the practical learning process that has been carried out in the form of practical assignments to students according to the targets that have been prepared, the lecturer needs to carry out a measurement or assessment of the competencies that students have obtained as a whole and comprehensively. Assessment of learning characterises how we may traditionally

view assessment. It involves making judgements about students' summative achievement for purposes of selection and certification, and it also acts as a focus for institutional accountability and quality assurance – for example, the number of 'good' degrees awarded is used as a key variable in university league tables. On the other hand, assessment for learning is formative and diagnostic. It provides information about student achievement which allows teaching and learning activities to be changed in response to the needs of the learner and recognises the huge benefit that feedback can have on learning (Black and Wiliam 1998, p. 3).

In this context, Abrahams and Reiss (2015, p. 40) describe about summative and formative assessment :

- Summative assessment: Assessment of the learning, where the marks are for a terminal test or examination.

- Formative assessment: Assessment for learning, where students are given feedback from the teacher during the teaching, they receive to progress as opposed to being given a final assessment of their learning.

In this evaluation context, efficiencies could include exemptions from instruction in parts of programmes, and increased institutional accountability based on outputs (defined as learning outcomes) of educational processes (CEDEFOP, 2011, p. 11). Competence-based qualifications consider the influence of the learning (or working) context when learning outcomes are defined and assessed. This context has a strong influence on the range of learning outcomes that are considered important, the interaction between them, the way the learner learns, how the outcomes are assessed and most importantly, the value attached to qualifications in the field (CEDEFOP, 2011, p. 12).

3.3.4 Teaching Internship in Schools

The initial TVET Teacher Training is aimed at producing qualified TVET teachers. To prepare qualified teacher-candidates, the TVET faculty offers two important programs in their curricula: the micro-teaching and the teaching internship. TVET teachers training need practical training to be able to guide students, transition from school to work because culture does not only rely on the

cognitive abstractions and artificial idealistic picture of the world (theory presented in the schools as suggested by scientists (Nanga, 2007). Prior to actually engage in teaching internship, students should first enrol in the micro-teaching class to prepare themselves in their internship program. The micro-teaching aims at developing student-teachers' basic skills in teaching such as the way they start teaching, steps in teaching learning activities and classroom management (Kılıç, 2010, p. 88; Şen, 2009, 2010). Nghia and Huynh (2017, p. 2) described that, several studies have suggested that the teaching internship can positively foster the development of teacher identity. Firstly, it provides preservice teachers with opportunities to develop relevant competence for their teaching profession, an important component that constitutes teacher identity. For example, a study conducted by Mukeredzi (2016, p. 89) in a rural area of South Africa reveals that the internship helps preservice teachers build a better understanding of schools in rural areas and appropriate pedagogy, discard stereotypes, increase their confidence, improve their teaching skills, and broaden their career prospects in these settings, which may ultimately foster an interest in rural teaching. In addition, Salazar Noguera and McCluskey (2017, p. 102) find that the teaching practicum enables Australian and Spanish preservice teachers to link what they have learned during the teacher education program to the reality of teaching. That period offers remarkably valuable learning experiences for these interns to develop initial teaching experience, increase the awareness of their profession and facilitate the transition from being students to being teachers (Nghia and Huynh, 2017, p. 2). Moreover, the internship often provides preservice teachers with opportunities to negotiate or align practices related to their teaching professions through which their teacher identity can be transformed. In most cases, preservice teachers go through the internship under the supervision of a senior teacher (Nghia and Hyunh, 2017, p. 3).

In many countries, the teaching internship program is the most favourably viewed component of teacher education. In Germany for instance, the teaching internship is considered as a necessary and valuable, though also doubtful, component of teacher education programs (Klinzig 1995). Supervised practice is a central part of the German *studienseminar*, a mandatory, post graduate component

of teacher education process, focusing on induction into school life. The time devoted to practice teaching varies greatly between institutions although there is a growing tendency to increase field-based experiences. An interesting view of the practical was expressed by White (1998) who saw it as a "rite of passage" which allows beginner to acquire cultural knowledge about teaching. One of the major strengths of the practicum is its focus on specialized teaching activities, thus counteracting one of the criticisms of teacher education programs; namely, their concentration on general aspects of schooling and lower regard for specialized activities (Lortie, 1995). Distinctions have been made between four different levels of practicum (Furlong et al, 1988). Level (a) is direct practice, i.e., teaching experiences in schools. Level (b) is indirect practice, i.e., training conducted in classes and workshops in teaching education institutions. Level (c) is practical principles, i.e., the study of principles of practice. Finally, level (d) is disciplinary theory, the study of practice and its principles in the light of research and theory. Though the practicum tends is to be highly valued by student teachers and practitioners. Respect to TVET teacher, there is an urgent need to the practical training to guide student's transition from school to world of work (Nanga, 2007). The teaching internship program can be got from practically oriented seminars through the practical lessons in workshops in the teacher college, on the one hand, and from teaching internships in Vocational schools under the guidance of experienced Vocational teachers also industrial internships, on the other hand. Teaching Internship help the student teacher to better adapt to his working environment and connect with the local as well as international realities. Although doing an internship is consider necessary for the development of personal and reflective experiences in teaching, participating in an internship alone is not enough to prepare student teacher for their later practice; the quality of trainee guidance is determining (Wilson, 1994, p. 109). With guidance from senior teacher at school, student teacher will be gained many experiences regarding the learning process as mentioned by Mukeredzi, 2016, mentors contribute to the success of preservice teachers' teaching practicum by giving curriculum guidance and constructive feedback about their teaching methods. From experience and literature, we can make a conclusion that preservice teachers' experiences with the internship may

strongly influence the development of their teacher identity (Nghia and Huynh, 2017, p. 3). Meanwhile, Carpenter and Blance (2007, p. 301) highlighted that, teaching internship can provide several benefits for the teacher student, the supervisor/mentor, the practicum school, the university, and teacher employers.

3.3.5 Internship in Industry

As we all know that the ultimate goal of vocational education is the profile of graduates who can answer industry challenges, and of course to achieve this goal, the profile of teachers who have practical skills is very crucial in a vocational education learning process. Prospective vocational teachers must have technical expertise in their fields. However, efforts to achieve the competencies of prospective vocational teachers have always lagged behind industries. This is due to the difficulty of teacher training institutions in providing facilities that meets industry standards. Partnership with industry in teacher training is thus, a solution to improve the competency of prospective vocational teachers, both in knowledge, skills, and corporate culture (Gunadi et al, 2019, p. 142).

An internship programme aims to train or develop the practical skills of students under supervision, so this programme is useful for exploring various skills associated with work (Gunadi et al, 2019, p. 142). Horne (2013, p.) conveyed several benefits of internship namely, observe the work and develop needed work skills, earn credit outside the classroom, experience work in chosen career fields, explore career options, learn work terminology, work climate, and business/ industry protocol, and skills in a chosen career field. Based on the above explanation, it appears that the internship will enable students to acquire expertise according to their needs and develop according to their careers. This programme is expected to be able to provide insight for prospective teachers to study the work climate (corporate culture), the applied rules, get a complete picture of the work field to be transferred later when they provide learning to vocational students (Gunadi et al, 2019, p. 142). Internationally, evidence suggests that providing workplace exposure for teaching staff at VET institutions helps to bring the classroom curriculum into closer alignment with the skills needs of industry, motivates the lecturers to 'raise their game', and generally promotes long-term

cooperation between college and company (Bukit, 2012, p. 124). Real workplace experience is essential to both students and college lecturers because there are important differences between the world of the training institution and the world of real work for which students are supposedly being prepared.

Training and appreciation of the corporate culture in the industry are expected to be integrated with classroom learning. Good work culture in schools will become a habit for students so that they have sufficient provision when entering the workforce. Cooperation with industries in the form of apprenticeship/training is expected to reduce the cost of learning, especially practices in higher education, but cooperation with mutual benefits to both parties only should be considered (Gunadi et al, 2019, p. 142). The pedagogical responsibility for what happens to students at work remains with vocational teachers (Isopahkala-Bouret, 2010, p. 220). In addition to technological competence, vocational teachers also need to have insights into the work culture in the industry, for example, discipline, work ethic, cooperation, communication, clean culture, work safety, and others (Goh and Zukas, 2016, p. 263). The traditional practice of vocational education programme is designed using competency-based approach (Sofyan, 2015). This learning emphasizes the development of competencies among students, which includes aspects of occupational-related attitudes, knowledge, skills, and values. This competency can be achieved when it pays attention to the rules of practical learning, and it involves practical workshops. Grosch (2017, p. 279) examines the developing of competency standards for vocational teachers in ASEAN, providing recommendations that vocational teacher education should focus on competency-based education, graduates, a balance between vocational, professional competencies and teaching and pedagogical competencies, relationships with industries (cooperative/dual system), high-quality pre-service education that will lead to the international level, especially in the ASEAN. Therefore, cooperation in improving skills at industries and teaching experience in Vocational High Schools is compulsory. Developing appropriate occupational competence among teachers is crucial as states that "teacher comprehension and belief dictate what they teach to the students (Billet, 2011, p. 89). When teachers do not participate in the industries working environment, they would not be competent in delivering

materials suitable for the development of the business sectors and industrial sectors. So, for prospective vocational teachers, an internship in the industry has many benefits, including sharpening skills, experiencing the real activities and the real work culture in the industry, so they have confidence when teaching students.

4. Research approach

The theoretical framework conditions described in the previous chapter constitute the basis for the empirical research and the presentation of the results of this work. In the following chapters, the justification of the research approach (sub chapter 4.1) will be described, the qualitative social research principles applicable to the scope of the thesis (sub chapter 4.2) will be described in detail, and the research design will be explained (sub chapter 4.3) including Data collection, transcribing, the survey method, and data analysis.

4.1 Justification of Research Approach

This chapter briefly describes the methods used to conduct the empirical part of this article, thereby collecting the information needed to answer research question. These sub-chapters are intended to make it easy for readers to understand and clearly illustrate the importance of qualitative research methods. In addition, the reasons, and pitfalls of choosing a qualitative research design will be explained in detail.

To answer the research questions, a suitable research method is needed, which should meet the characteristics of the research. In this dissertation, the type of research is empirical research, and the methods and steps used are qualitative methods and data analysis method developed by Philip Mayring. The purpose of the empirical research conducted is to explore the skills deficiencies of future TVET teachers in West Java. Empirical research is research based on observation and measurement of phenomena directly experienced by researchers. The data collected in this way can be compared with theory or hypothesis, but the results are still based on actual experience. The data collected are all primary data, although auxiliary data from the literature review may constitute the theoretical background. The author uses this method with the consideration that the subject of this research is something that requires direct approach and does not use a numerical approach. Then the next reason is the approach with qualitative methods that makes it easier for researchers when dealing with realities in the field, and the most important thing is the close emotional relationship between the researcher and the respondent, both

from the physical and mental aspects so that it can produce authentic and in-depth data. The other aspects are, qualitative methods are a research method based on the philosophy of post positivism, used to examine the conditions of natural objects, (as opposed to experiments) where the researcher is the key instrument, data collection techniques are carried out by in-depth interviews, the analysis is inductive in nature, and the results emphasizes meaning rather than generalizations (Sugiyono, 2013).

So, in this study as much as possible to describe a symptom of an event, an event that occurs in the present or take actual problems as they happen in the field. The research was conducted with a conceptual approach and analysis of the problems taken by comparing the data obtained from interviews in the field with good concepts from books, studies, journals, papers, applicable regulations, and other sources. systematically.

With qualitative methods will obtain an in-depth picture of the events and facts. This qualitative approach is used, because the subject is about the activities of the practical learning process in the Mechanical Engineering Education Study Program, the Faculty of Education and Vocational Technology, and the activities of teaching internships implementation at destination schools that cannot be stated by calculating numbers such as in quantitative research. According to Moleong, 2002, there are 3 main reasons for choosing qualitative research, namely:

1. Adapting qualitative methods is easier when faced with multiple realities.

2. This method directly presents the nature of the relationship between researchers and informants.

3. This method is more sensitive and can adapt to a lot of sharpening the joint influence on the patterns at hand.

According to Bogdan and Taylor cited by Moleong (2002) Qualitative method is "a research procedure that obtains descriptive data in written or spoken form the people and their behaviour which is being observed. "According to them, this approach is purposed to seek the understanding of a phenomenon or other certain problem by focusing on the total picture rather than breaking it down into variables.

The type of this research provides an overview of all forms of phenomena in the field aims to obtain information about incident currently. The researcher here does not test the hypothesis, but only describe the information as it is. Results the research is illustrated in the chart, table and image models based on factual data support.

This study was used to find out how the implementation of the learning process carried out by prospective teachers in teaching internship program at Secondary Vocational Schools (SMK's) in accordance with their areas of competence conducted related with kind of skill deficit held by prospective teachers. And practical learning process carried out at the Universitas Pendidikan Indonesia (UPI), Vocational Technology Education Faculty in the Mechanical Engineering Department, to find out the factors influence of the skills deficit held by prospective teachers.

4.2 Basic of Qualitative Social Research

The defined fundamentals of qualitative social research form the starting point for the implementation and evaluation of qualitative empirical research designs. In the following chapters, after foundations and principles (sub chapter 4.2.1) described, the basics of qualitative thinking (sub chapter 4.2.2) and pillars (sub chapter 4.2.3) of qualitative thinking and the significance of the study (sub chapter 4.2.4) will be described in this chapter.

4.2.1 Foundations and Principles of Qualitative Social Research

First, it is important to recognize that there is no single, accepted way of doing qualitative research. Indeed, how researchers carry it out depends upon a range of factors including: their beliefs about the nature of the social world and what can be known about it (ontology), the nature of knowledge and how it can be acquired (epistemology), the purpose(s) and goals of the research, the characteristics of the research participants, the audience for the research, the funders of the research, and the position and environment of the researchers themselves.

How differences in the mix of these factors have led to distinctive approaches to qualitative research (Snape and Spencer, 2003, p. 1).

Before examining the differing methodological principles that characterize qualitative research and that distinguish it from quantitative research, it is useful to examine briefly what is meant by these terms. The meaning of the term quantitative is self-evident and refers to the tradition of research dominant in science since the 17th century, with its emphasis on the measurement and quantification of phenomena as essential steps in the process of enquiry. It will be seen that this emphasis on measurement is also linked to a particular set of philosophical assumptions about the nature of the world and how it works, as well as the understanding of it. The quantitative tradition of research encompasses the traditional public health disciplines of epidemiology and statistics, and medicine and biology, as well as nutrition itself. Qualitative research is generally presented as an opposing category to quantitative research, but the term itself, however, is rarely explained; if quantitative research is about quantities, what qualities is qualitative research concerned with? Qualitative research is concerned with the quality or nature of human experiences and what these phenomena mean to individuals.

Qualitative research thus tends to start with 'what', 'how' and 'why' type questions rather than 'how much' or 'how many' questions. It is also concerned with examining these questions in the context of everyday life and each individual's meanings and explanations (Draper, 2004, p. 642). Qualitative research is a systematic and subjective approach to highlight and explain daily life experiences, and to further give them proper meaning (Burns and Grove, 2009, p. 65). Crescentini and Mainardi (2009, p. 433) have presented some guidelines, and suggestions for the preparation of a good qualitative research paper. Qualitative research places itself among other priorities. Here, you usually do not need to start with the theoretical model of the problem being studied, and do not have to conduct hypothetical and operability research. Similarly, qualitative research does not use measurement as a model as in natural science. Finally, you are neither interested in standardizing the research situation as much as possible, nor in ensuring representativeness by randomly sampling participants. Instead, qualitative

researchers select participants in a targeted manner and integrate a small number of cases based on their relevance. The design of the data collection is more public, and its purpose is to provide a comprehensive picture by reconstructing the case studies in the study. Therefore, there are fewer pre-defined questions and answers. More use of open questions. It is hoped that participants will answer these questions spontaneously in their own language. Researchers usually deal with narratives of personal life history. Qualitative research addresses issues by using one of the following three approaches. It aims (a) at grasping the subjective meaning of issues from the perspectives of participants (e.g. what does it mean for interviewees to experience their university studies as a burden?). Often, (b) latent meanings of a situation are in focus (e.g. which are the unconscious aspects or the underlying conflicts that influence the experience of stress for the student?). It is less relevant to study a cause and its effect than to describe or reconstruct the complexity of situations. In many cases, (c) social practices and the life world of participants are described. The aim is less to test what is known (e.g. an existing theory or hypothesis) than to discover new aspects in the situation under study and to develop hypotheses or a theory from these discoveries.

Therefore, the research situation is not standardized; rather it is designed to be as open as possible. A few cases are studied, but these are analysed extensively in their complexity. Generalization is an aim not so much on a statistical level (generalization to the level of the population, for example) as on a theoretical level. Research participants may encounter the following research situations. They participate in research in their personal capacity and expect them to contribute their own experiences and opinions according to their specific living conditions. The range they consider essential, dealing with problems in different ways, and providing various answers with different levels of detail is very large. The research situation is more designed as a dialogue, in which exploration, new aspects and their own estimates can find their place (Flick, 2015, p. 600). Brinkmann et al, 2014, p. 20 have discussed six histories of qualitative research as: i) the conceptual, ii) the internal, iii) the marginalizing, iv) the repressed, v) the social, and vi) the technological histories of qualitative research. In content analysis, the research report is divided into five parts (Williams, 2007, p. 65-71): i) description of the

research material, ii) characteristics and quality of the research, iii) description of the methodology, iv) statistical analysis table showing frequency, and v) Draw conclusions about patterns, themes or biases found in human communication and data collection. Qualitative research can be defined as "multiple methods of focused attention, involving explanatory, naturalistic approaches to the subject" (Denzin and Lincoln, 2005, p. 3). If you think this is too vague, it may be because the meaning of the term is too diverse. To illustrate this concept, we will describe the characteristics of qualitative research. Since many authors have pointed out many different characteristics, and since it is impossible to summarize all the characteristics in such a small space, we will only discuss three characteristics that are considered important, especially for students majoring in social work. Qualitative researchers try to understand the meaning that people give to their behaviour or social phenomenon. In other words, researchers observe people from the inside.

For example, when you interview users of a residential nursing home for people with disabilities, you will get pictures of how they feel about their normal life in the house. How do they think about housing or working at home? What restrictions do they notice about their residence? How do they handle conflicts with caregivers and roommates? Which default rules cover their relationships? For social workers who want to improve their nursing homes from the perspective of users, such questions will be very interesting. In this dissertation, the researcher conducted research on the practical skills deficit possessed by prospective mechanical engineering teachers who graduated from the University in west java when carrying out a teaching apprenticeship program in schools, to get a complete picture of this phenomenon the researcher conducted in-depth interviews with teacher supervisors in schools to find out what skills shortages were the prospective teacher?, then the researcher also conducted in-depth interviews with lecturers at the university to find out how is the learning process carried out in order to prepare prospective SMK teachers, this is done to find out what factors influence the practical skills deficit possessed by graduates?

Qualitative research can thus be broadly described as interpretative and naturalistic, in that it seeks to understand and explain beliefs and behaviours within

the context that they occur. Beyond this definition, however, it is important to point out that within the broad tradition of qualitative research there are several theoretical orientations. Many, but not all, these orientations derive from the social sciences, and in particular sociology and anthropology, but qualitative research methods are now being used in a wide range of fields and disciplines. Theoretical frameworks or perspectives include ethnography, ethnomethodology, social constructionism, symbolic interactionism, structuralism, post-structuralism, phenomenology, feminism, post-modernism, and critical realism. The focus of these approaches ranges from broad philosophical postulates concerning the nature of reality (ontology) and how it comes to be known (epistemology) to narrower theoretical or ideological concerns, such as gender domination. For instance, critical realism, which underpins the interpretive phenomenological analysis described by Fade (2004) is very much concerned with ontology and the practical relevance of the knowledge of reality. It is beyond the scope of the present paper to discuss the features of each of these approaches, but it is important to distinguish between a general methodological commitment to qualitative research and the commitment to specific theoretical or disciplinary frameworks (for more discussion, see Creswell, 2007). Each of the latter will frame a research question in a particular way and use differing approaches to data collection, analysis, and interpretation (Draper, 2004, p. 642).

Most texts on qualitative research begin with some attempt to define what is meant by this term, either theoretically or practically, or both. We will follow in this time-honoured tradition because it is important to understand the diversity inherent in this term and because it is impossible to discuss qualitative research practice without defining what is meant by it. However, providing a precise definition of qualitative research is no mean feat. This reflects the fact that the term is used as an overarching category, covering a wide range of approaches and methods found within different research disciplines. Despite this diversity and the sometimes-conflicting nature of underlying assumptions about its inherent qualities, several writers have attempted to capture the essence of qualitative research by offering working definitions or by identifying a set of key characteristics. In the second edition of their Handbook of Qualitative Research,

Denzin and Lincoln (2005, p. 3) cited by Snape and Spencer (2003, p. 2-3) offer the following definition: "Qualitative research is a situated activity that locates the observer in the world. It consists of a set of interpretive, material practices that makes the world visible. These practices turn the world into a series of representations including fieldnotes, interviews, conversations, photographs, recordings, and memos to the self. At this level, qualitative research involves an interpretive, naturalistic approach to the world. This means that qualitative researchers study things in their natural settings, attempting to make sense of, or to interpret, phenomena in terms of the meanings people bring to them"

Snape and Spencer (2003, p. 3-5)also remind us, to avoid becoming overly focused on the variations that make simple definitions of qualitative research difficult to attain, it is perhaps helpful to highlight key elements which are commonly agreed to give qualitative research its distinctive character. These include:

- aims which are directed at providing an in-depth and interpreted understanding of the social world of research participants by learning about their social and material circumstances, their experiences, perspectives, and histories.

- samples that are small in scale and purposively selected based on salient criteria.

- data collection methods which usually involve close contact between the researcher and the research participants, which are interactive and developmental and allow for emergent issues to be explored.

- data which are very detailed, information rich and extensive.

- analysis which is open to emergent concepts and ideas and which may produce detailed description and classification, identify patterns of association, or develop typologies and explanations.

- outputs which tend to focus on the interpretation of social meaning through mapping and 're-presenting' the social world of research participants.

Table below explain regarding the methodological stance associated with qualitative research which will guide us in term of research activity.

Table 4.1 Methodogical Stances Associated with Qualitative Research

NO.	Methodological Stance	Result/activity
1.	Perspective of the researcher and the researched	• Taking the 'emic' perspective, i.e. the perspective of the people being studied by penetrating their frames of meaning • Viewing social life in terms of processes rather than in static terms • Providing a holistic perspective within explained contexts • Sustaining empathic neutrality whereby the researcher uses personal insight while taking a non-judgemental stance
2.	Nature of research design	• Adopting a flexible research strategy • Conducting naturalistic inquiry in real-world rather than experimental or manipulated settings (though methods vary in the extent to which they capture naturally occurring or generated data
3.	Nature of data generation	• Using methods of data generation which are flexible and sensitive to the social context in which the data are produced • Using methods which usually involve close contact between the researcher and the people being studied, where the researcher is the primary instrument
4.	Nature of the research methods used	• Main qualitative methods include observation, in-depth individual inter• views, focus groups, biographical methods such as life histories and narratives, and analysis of documents and texts
5.	Nature of analysis/interpretation	• Based on methods of analysis and explanation building which reflect the complexity, detail, and context of the data • Identifying emergent categories and theories from the data rather than imposing a priori

		categories and ideas
		• Respecting the uniqueness of each case as well as conducting cross-case analysis
		• Developing explanations at the level of meaning rather than cause
6.	Nature of outputs	• Producing detailed descriptions and 'rounded understandings' which are based on, or offer an interpretation of, the perspectives of the partici• pants in the social setting
		• Mapping meanings, processes, and contexts
		• Answering 'what is', 'how' and 'why' questions
		• Consideration of the influence of the researcher's perspectives

Source: Snape and Spencer, 2003, p. 4

Jupp (2006) described the principles of qualitative approach could be summarized into three views, which follows:

a. *Constructivism* recognizes that meanings of things are not objectively discovered; rather they are subjectively created and imposed by people in given contexts. If the context changes so are the construct. For example, meanings created by a Filipino mother for motherhood will be different from the definitions provided by an American mother.

b. *Interpretivism* emphasizes that the definitions of both are equally important for analysis and that there is no exact standard definition that requires one universal objective interpretation that is apparent in the tradition of positivism (a view of quantitative approach).

c. *In inductivism*, the new set of knowledge, meanings or theories are emergent through the process of induction. The approach does not require the testing of a particular extant theory or set of knowledge; rather it aims to produce new ones.

There are about seven qualitative approaches being utilized across the different areas of Sciences, Humanities and Education:[16]

1. Ethnography is usually useful in cultural studies as it aims to explore, describe, and understand an intact cultural group.

2. Case study is particularly being utilized in clinical and health settings. Its goal is to collate and analyse all relevant information about a particular case under investigation such as an HIV patient or an individual with schizophrenia.

3. Grounded Theory focuses on emerging a theory about a particular reality, so it undergoes a rigorous process of reflexivity, cross-analysis, and emergence.

4. Phenomenology puts into the surface the participants' subjective meanings of a phenomenon as experienced by him/her.

5. Autoethnography is an approach wherein the researcher himself/herself is the researched. This is usual in queer theory, sexuality studies, research areas, and emotionally loaded experiences.

6. Meta-analysis and discourse analysis are common in philosophical research. These involve putting together theories or discourses for cross-analysis, confirmation, debates, and/or theory generation.

7. Narrative research is for the exploration and description of events and personal accounts which are chronologically connected, thus historical. This is interconnected with larger events beyond the individual.

4.2.2 Postulate of Qualitative Thinking

Five postulates can be derived from the qualitative research approaches according to Mayring (2002) 1, which bring the fundamentals of the qualitative way of thinking to a common denominator and represent the basic structure of qualitative thinking. According to Mayring, these postulates should contribute to an increased use of qualitative thinking in the research and knowledge process.

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[16] Source: https://simplyeducate.me/2014/11/16/qualitative-research-definition-and-principles-5/ .

Table 4.2 Postulates of Qualitative Thinking

No.	Postulate	Explanation
1.	Subject	The subject of human scientific research is always people, subjects. The subjects affected by the research question must be the starting point and goal of the investigations.
2.	Description	At the beginning of an analysis there must be an exact and comprehensive description of the subject area.
3.	Interpretation	The subject of investigation in the human sciences is never completely open; it must always be opened through interpretation.
4.	Everyday life	Human science subjects must always be examined in their natural, everyday environment as far as possible.
5.	Generalization process	The generalizability of the results of research in the human sciences is not automatically established through certain procedures; it must be justified step by step in each individual case.

Source: Mayring, 2002, p. 20-24

Postulate 1: subject

The subject of research in the social sciences is always the human being. The research project must have its starting point and its goal with the persons concerned. Direct and open access to the people involved in the research is the best guarantee to immediately notice possible deviations from the subject. The subject orientation is a central requirement of qualitative thinking.

Postulate 2: Description

Before analysing and / or explaining a research object, it should always be described precisely and comprehensively (description). The context of the research is also presented in this way.

Postulate 3: Interpretation

An object of investigation is never fully disclosed if it is not also interpreted. This performance of interpretation is closely related to the hermeneutic

understanding of meaning. The deeper meaning of a research area is only revealed through an interpretation.

Postulate 4: Everyday Life

Based on the knowledge that people react differently in constructed test situations that take place in the laboratory than in their daily life situation, investigations should be carried out in largely natural work or everyday situations. However, even this approach involves distortions. The natural situation is given by, for example, an interview taking place in the interview partner's apartment. However, if the interview is recorded on video, the unfamiliar presence of the camera can inhibit or intimidate the respondent in his / her statements.

Postulate 5: Generalization process

The generalization process following an investigation, in which general findings are derived from the results, must be justified with arguments, i.e. it must be discussed why these results should also apply to other situations and times. Or it must be made clear in which case, for which situation and in which time the results are valid.

4.2.3 Pillars of Qualitative Thinking

In the search for a fundamental understanding of qualitative social research, there is no getting around the 13 pillars of qualitative thinking by Philipp Mayring. So, we can understand and apply the methodological principles of qualitative research in the shortest possible time, in this sub chapter a detailed overview of all 13 pillars of qualitative thinking will describe. In addition, some additional explanations, and examples from my own wealth of experience and appropriate secondary literature. Mayring differentiates the theoretical considerations (figure below) and summarizes them in a total of 13 pillars of qualitative thinking (Mayring, 2002, p. 28).
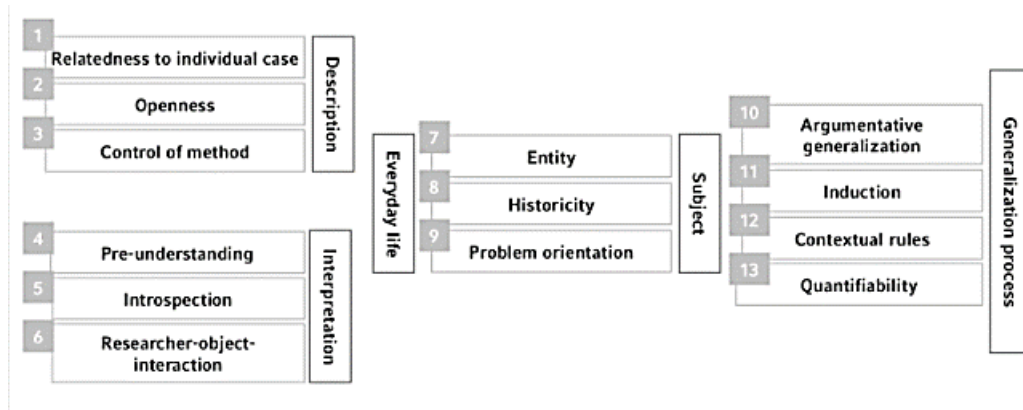
Figure 4.1 Pillars of Qualitative Thinking

Source: Mayring, 2002, p. 26

Here is the explanation of the 13 pillars of qualitative thinking based on Philip Mayring.[17]

The first 3 pillars are assigned to the principle of description:

1. Relatedness to individual case

    In this regard, Mayring explains that the results can move away from individual cases, but that they always must be related back to the individual cases. For example, we conduct interviews in a company. Then we have some kind of case study. We can now discuss the results of the interview analysis about a certain theory, for example. The theory has always arisen through a generalization. According to Mayring, we should not generalize too far here, i.e. form a new theory, because our individual case could move in a certain context that does not allow generalization.

2. Openness

    A change in the ongoing research process should always be possible. This can concern the theoretical framework, the research questions, or individual methodological steps. According to Mayring, qualitative research should always be flexible, adaptable, and open to changes. As always, the same applies here: we must be able to justify every decision - then it is perfectly okay to make it.

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[17] Source: https://shribe.de/die-13-saeulen-des-qualitativen-denkens/ .

3. Method control

   This point is basically about the replicability, which must be given by the methodical description. This means that we describe our methodological approach in as much detail as possible and refer to one or more authors who suggest a systematic approach for what we have implemented.

Pillars 4-6 of the 13 pillars of qualitative thinking are assigned to the principle of interpretation.

4. Pre-understanding

   The interpretation of our results on a theoretical level is strongly influenced by our understanding of the individual components of the theory. In qualitative research we mostly make use of concepts or, to put it simply, theoretical terms. We must define these clearly so that the interpretation can be traced back to this understanding.

   A basic law of hermeneutics states that one's own prior understanding or prior knowledge always influences the individual's performance of interpretation (Danner, 2006). This procedure is known as a hermeneutic circle (Figure below). The analysis of social science subjects is always shaped by prior understanding (...). The prior understanding must therefore be disclosed and gradually developed further on the subject (Mayring, 2002).
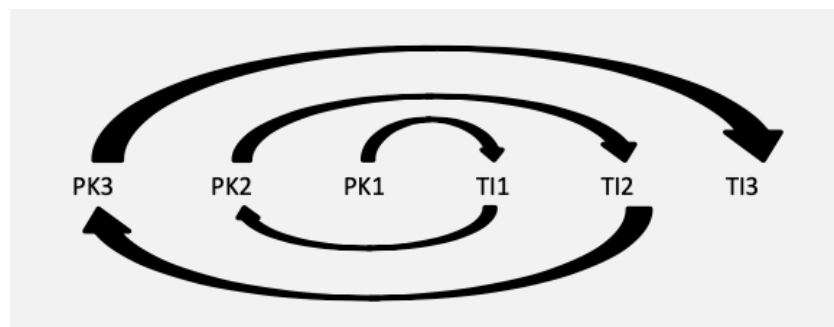
Figure 4.2 The Hermeneutic Spiral

Source: Mayring, 2014, p. 27; Danner, 2006, p. 57

PK= Preknowledge

TI= Textinterpretation

5. Introspection

   This column means the addition of subjective data that we as a researcher can contribute. This could be, for example, notes, thoughts, or other transcripts that were created during the research process or data collection. Such an approach is completely enriching for qualitative thinking, someone who is more influenced by a quantitative paradigm would have his hair on end here. A prominent application of such introspection are the so-called memos, which are used in the grounded theory methodology. It is important that you always mark such data as what they are. So, they can be a good addition to the empirically collected data.

6. Researcher-object interaction

   This last pillar of the interpretation says that it always depends on the relationship or communication between we as researcher and the data subjects. The easiest way to make this clear to ourselves is through the example of qualitative interviews. Here we influence the way we ask questions, which questions they are and how you interact with the person on the other end, what results you ultimately have and how we can interpret them.

The pillars 7-9 are assigned to the principles of subject-relatedness and the everyday environment.

7. Entity/Holistic

   This unity of the 13 pillars of qualitative thinking is a little more difficult to explain. Put simply, the point here is that we can leave the overall view in the analysis and make a so-called analytical separation. This can be, for example, that you only analyse the statements of an interview partner in her role as an employee of a certain company and the small area of the subject to be examined. Afterwards, for example in the discussion, we should put everything back together and look at it in the overall context.

8. Historicity

   The point here is simply that some objects or phenomena may have grown up historically. So, this past should always be considered in the interpretation.

9. Problem orientation

   The primary goal of the research process is of course to better understand objects and phenomena and to find explanations. But the practical added value is not to be despised either. This is also the "last step" in science, which is often neglected. How can these findings be applied in practice and make the world a better place?

The last four of the 13 pillars of qualitative thinking are part of the generalization process.

10. Argumentative generalization

    When discussing the results, it must be made clear which partial results can be generalized to what extent. The "extent" here can be industries (for companies), times, groups of people and other units. Of course, this must be argued again neatly.

11. Induction

    Logically, it is a bit strange why this is the 11th pillar. Because with induction, we take another step back: Induction is an important process in data analysis and typical of qualitative research. In doing so, we systematically generate abstract categories from your data.

12. Contextual rules

    With pillar number 12, social research can be distinguished from the natural sciences. The latter can fall back on the laws of nature, but whenever a person is involved, irregularities, contradictions and subjective evaluations arise. To bring everyone under one roof, we can set up "rules" on how these differences should be made uniform. Again, however, we need to be aware of the context to which these rules apply.

13. Quantifiability

    The last pillar creates the transition to quantitative research. Qualitative research should make it possible that certain concepts, prepositions, or categories can ultimately be used to form constructs. These can then in turn be tested using quantitative methods and robust theory can be formed.

4.2.4 Significance of The Study

Answering the research questions requires that personal assessments, individual interpretation patterns and (professional and academic) biographies of the lecturers and supervisor teachers must be collected, so that the use of a qualitative approach is recommended here. Qualitative research has the possibility and the aim of describing living environments from the inside out from the perspective of the acting people. It is intended to contribute to a better understanding of social reality and to draw attention to processes, interpretation patterns and structural features "(Flick et al, 2000, p. 14).

Investigations are considered to be of sufficient quality if (...)
... individual case analyzes are also built into the research process
... the research process is generally kept open for additions and revisions
... methodically controlled, the procedural steps are carried out in an explicit and rule-based manner
... the prior understanding of the researcher is disclosed
... as a matter of principle, introspective material is also allowed for analysis
... the research process is viewed as an interaction
... a holistic conception of the subject can also be seen
... the object is also seen in its historical context
... is linked to specific practical problems
... the generalizability of the results is justified by argument
... inductive methods are also permitted to support and generalize the results
... the uniformity in the subject area can be mapped with context-bound rules
... a rigid legal concept is avoided

Figure 4.3 Qualitative Checklist

Source: Mayring, 2002, p. 36

From the five postulates (sub chapter 4.2.2) and the 13 pillars of qualitative thinking (sub chapter 4.2.3), Mayring derives a qualitative checklist (Figure 4.3), compliance with which ensures examinations are of sufficient quality (Mayring, 2002, p. 38). The underlying areas of investigation for the empirical data collection designed as field research (problem-centred interviews) are the activity of practical learning process at TVET faculty in university and university student's activity in teaching internship program at secondary vocational schools (SMK's). "Especially in times in which firmly established social worlds and styles are dissolving and

social life is made up of more and more new forms of life and ways, research strategies are required that initially provide precise and dense descriptions" (Flick, 2007, p. 17). The described postulates of qualitative thinking (sub chapter 4.2.2) are the subject-relatedness of the research, emphasis on the description and interpretation of the research subjects, the requirement to carry out the investigation in the everyday environment of the subjects and generalization of the results as a generalization process (Mayring, 2002, p. 19) . The methods used in this study are based on a qualitative research paradigm (Lamnek, 1995, p. 42). In the following, some important, already described, aspects of qualitative social research are presented in more detail in relation to the study. In relation to the present research project, teaching internship program at secondary vocational schools (1st investigation phase: inductive category formation) and activity of practical learning process at TVET faculty (2nd investigation phase: also, inductive category application) in West Java are the focus of the research interest as affected research subjects. The questions about what kind of skills deficit (1st investigation phase) and factors influence of skills deficit (2nd investigation phase) are answered (Figure 4.3). The focus is on possible exits by the supervisor teachers interviewed about the skills deficit occurred from prospective teachers from university while teaching internship program and the practical learning activity at TVET Faculty to investigate the factors influence of skills deficit from prospective teachers. At the same time, recommendations for action are to be derived from the answers to the research questions and from the categories developed and applied, which help to development of the learning process carried out at universities so that the skills possessed by prospective vocational teachers are in accordance with the needs of the school. The requirement for the subjects to relate to everyday life is thus secured within the research process, as the interviews do not take place in labor, but in the natural environment of the Supervisor teachers and lecturers (university and schools), which avoids distortions caused using the research methods.

Qualitative research approaches require an exact description of the subject area at the beginning of the research process and the analysis, whereby quantitative data can also be included. In the present study, preliminary data were obtained from official documents issued by the government in relation to evaluating the needs of

vocational teachers, such as the Presidential Instruction on the revitalization of SMK, the Law on Teachers and Lecturers, and the Competency Standards for Vocational Teachers. When interpreting the data collected, it is important to note that your own experience and knowledge, which flow into the interpretation and evaluation process, must be disclosed in advance. The pre-understanding of the investigator within the present study is characterized on the one hand by many years of experience in the conception, implementation, and evaluation of various measures to raise awareness of technical vocational training activity and initial TVET teacher education and training at university and secondary vocational schools (SMK's) in West Java. On the other hand, many years of experience as a lecturer at the further TVET teacher training institution flow into the pre-understanding of the examiner. This prior knowledge and experience reveal the individual's prior understanding (sub chapter 4.2.3) and are legitimate in qualitative social research (Mayring, 2002). In this context, it should be noted that the researcher and the research subject act in an interaction process that is constantly developing and changing (Chapter 4.2.1. Chapter 4.2.3). Especially with the target group addressed in the study, it is very important to create a basis of trust, respect, and acceptance in order to counteract possible refusal tendencies on the part of vocational teacher and lecturer and TVET faculty, which could seriously impair the data recording. The respondents both supervisor teachers and lecturers react very sensitively, sometimes suspiciously, to a purely formal interest in themselves and their experiences.

The principle of openness (sub chapter 4.2.1: sub chapter 4.2.3) is to be implemented by providing enough freedom for individual statements by the respondents within the guideline-based, problem-centered interviews. The supervisor teachers and lecturers can freely describe [...] ,,what is important experience from them to share and in the way in which they want to express themselves "(Helfferich, 2005, p. 22). The use of a guideline (Appendix 1: Interview guidelines) with previously defined question blocks make it possible that the required and desired information regarding the kind of skills deficit and its factors influencing was addressed. Even in the problem-centered interview, the respondent is considered an expert on his own (professional and study) biography

and should have the opportunity to answer informally and freely. The communication situation in qualitative interviews should, if possible, always take place in the natural environment of the interviewee and have a natural character (sub chapter 4.2.1. sub chapter 4.2.3). In this study, secondary vocational schools (SMK's) became the starting point for conducting interviews to dig deeper into the skills deficit that arises from vocational teacher candidates, then interviews were conducted with lecturers in the faculty of vocational technology education at university to dig deeper about the implementation of practical learning that has been carried out to prepare vocational teacher candidates. Interview locations at SMK and universities have comfortable classrooms so that interviews can take place in a calm and trusting atmosphere. If the interview cannot be conducted at a vocational school or university, the respondent chooses the location himself so that the interview can also be conducted in a familiar environment. Through many years of experience in the field of teacher training for secondary vocational schools' teachers in West Java and as a lecturer at the further TVET teacher training institution, the investigator is familiar with the special language habits of supervisor teachers and lecturers. For the interview situation, this meant that the interviewer largely took on the function of an active listener and had to animate the respondents to speak, e.g. by means of non-verbal signals (body moves, nod, smile).

It is important to establish a relationship of trust with the supervisor teachers and lecturers as respondents, even for the short duration of the interview, that empathy and communicative skills are prerequisites for a lively flow of linguistic information, which may, however, go beyond predetermined categories, the requirement for process-oriented qualitative research (sub chapter 4.2.1) becomes clear within the investigation by the fact that, starting with the research questions, which are based on the previous experience, prior knowledge and research interests of the investigator, a first interview (1st investigation phase: category formation) results. A category grid resulted from the results of the first investigation phase, the review, specification, and evaluation of which was part of the second investigation phase (also category formation). At the same time, both investigation phases provided essential impulses for possible further investigations (circular process-like). The results of the inductive category formation (1st investigation phase and

2nd investigation phase) lead to recommendations for action for a development of initial TVET teacher education and training. The principle of the reflexivity of research and object (sub chapter 4.2.1) is based on the idea of the hermeneutic circle (Chapter 4.2.3) and states that every interpretation always refers reflexively to other interpretations, so that this circularity is considered in the evaluation process must (Lamnek, 1995, p. 25). For the present study, this means that an interview statement is always related to previous statements by the interviewed person and should never be viewed in isolation. This must be considered both during the interview and when interpreting the results. The evaluation methods used within the investigation (sub chapter 4.2.3) represent per analysis tools, so that the demand for reflexivity of research and subject is met.

4.3 Design of the Study

The basis of the qualitative research design described in the previous chapter is the basis of the empirical research design of this study, which is explained in the following chapters. Based on methodological processes (Chapter 4.3.1), methods for data collection (Chapter 4.3.2), problem-centered interview (Chapter 4.3.3), and construction of interview guidelines (subchapter 4.3.4), transcription on the interview result (4.3.5), Translation and language barriers (4.3.6), and data verification technique (4.3.7) were carried out description, and finally, the content analysis related to the current work is considered (Section 4.3.8).

Assuming that there is little knowledge about the objects to be checked before the investigation, to systematically develop the research objects, an exploratory, discovery-based method was chosen as part of this dissertation. The research process of this dissertation begins with the discovery of research gaps. On this basis, the author evaluated the existing literature and concluded that these gaps are worthy of in-depth study. This has been followed by formulating the respective research questions. In this step, one research question with 2 sub-research questions emerged. Both require empirical work. The next step in the research process was the conduction of empirical qualitative research, namely problem-centered interviews with supervisor teachers at respective Secondary vocational schools that been a place for teaching internship for answering sub-research question 1 and with

lecturers at TVET faculty at UPI Bandung for answering sub-research question 2. At the same time, theoretical research has been done to complement the literature review as well as to complete the answers. In the final step, the findings of the empirical and theoretical research will be presented, and conclusions will be drawn. With the method for data collection (sub chapter 4.3.1) and the use of guideline-based interviews (sub chapter 4.3.4) for data collection as well as category-based evaluation procedures in content analysis (sub chapter 4.3.8) for generating results, qualitative methods of social research are used for data collection and data evaluation within the scope of the investigation. The investigation is divided into two parts. In both cases, a document analysis precedes the interview, which primarily serves to prepare, create guidelines, and supplement the interviews. The first part focuses on prospective vocational teachers (objects of investigation) in teaching internship program (at 7th semester of the bachelor's degree study) from Universitas Pendidikan Indonesia (UPI) in Bandung West Java. This results in a catalogue of skills deficit of mechanical engineering prospective teachers in teaching internship program. In the second step, focuses on lecturers at TVET Faculty Universitas Pendidikan Indonesia (objects of investigation) in practical learning process activity in TVET faculty. The result was the factors influence of skills deficit of mechanical engineering prospective teachers. The collected problem-centered interviews are analysed and evaluated after the transcription with the help of inductive category formation(chapter 4.3.8), a form of analysis of the qualitative content analysis (chapter 4.3.8). For this purpose, ten interviews with supervisor teacher in teaching internship program and ten interviews with lecturer in practical learning activity at TVET faculty of Universitas Pendidikan Indonesia (UPI) were carried out.

Table 4.3 Design of The Study

	Central research question	what kind of skills deficit and its factors influence, owned by prospective mechanical engineering teachers related to the school needs for competent teachers in West Java? To make it easier to answer the main questions above, two sub research questions were developed, which is: • What kind of skills deficit of prospective mechanical engineering teachers in teaching internship program at schools? • What factors influence of skills deficit of prospective mechanical engineering teachers?
1st Investigation Phase (Category Formation)	**Research aspect**	Kind of practical skills deficit held by prospective teachers in teaching internship program at secondary vocational schools (SMK's)
	Perspective	Practical teaching ability from prospective mechanical engineering teacher
	Question of empirical investigation	• What kind of abilities are in accordance with the school needs held by prospective mechanical engineering teachers? • What kind of skills deficit held by prospective mechanical engineering teachers still have?
	Survey methods	• Document analysis • Guided interviews
	Respondents target group	Supervisor teachers in teaching internship program
	Number of respondents	N = 10
	Evaluation	Inductive category formation (qualitative content analysis)
	Result	• Catalog of skills deficit from prospective mechanical engineering teachers • Main category of skills deficit form prospective mechanical engineering teachers

2nd Investigation Phase (Category Formation)	**Research aspect**	Factors influence of practical skills deficit held by graduate teachers related to the schools needs
	Perspective	Practical learning process conducted at TVET faculty for prospective mechanical engineering teacher in Universitas Pendidikan Indonesia (UPI)
	Question of empirical investigation	- How the practical component in curriculum carry out in university? - How the practical learning process conducted to prepared them for become vocational teacher in future? - What kind of activity conducted in practical learning process in university?
	Survey methods	- Document analysis - Guided interviews
	Respondents target group	Lecturers who teach the practical courses/subjects
	Number of respondents	N = 10
	Evaluation	Inductive category formation (qualitative content analysis)
	Result	- Catalog of factors influence of skills deficit from prospective mechanical engineering teachers - Main category of factors influences of skills deficit form prospective mechanical engineering teachers
	Main Result	Recommendation for action for a development the initial TVET teacher education and training to fulfil the schools needs

After the translation and transcription, the interviews are analysed and evaluated with the help of the nominal inductive category application, a form of analysis of the qualitative content analysis. This results in the main categories of skills deficit and its factors influence of the practical skills deficit from prospective mechanical engineering teachers. From the answers to the questions of the empirical investigation, recommendations for action for a development of initial TVET teacher education and training are then derived. Table 4.3 summarizes the

design of the study and Figure 4.4 shows the methodical approach and the results of the study.
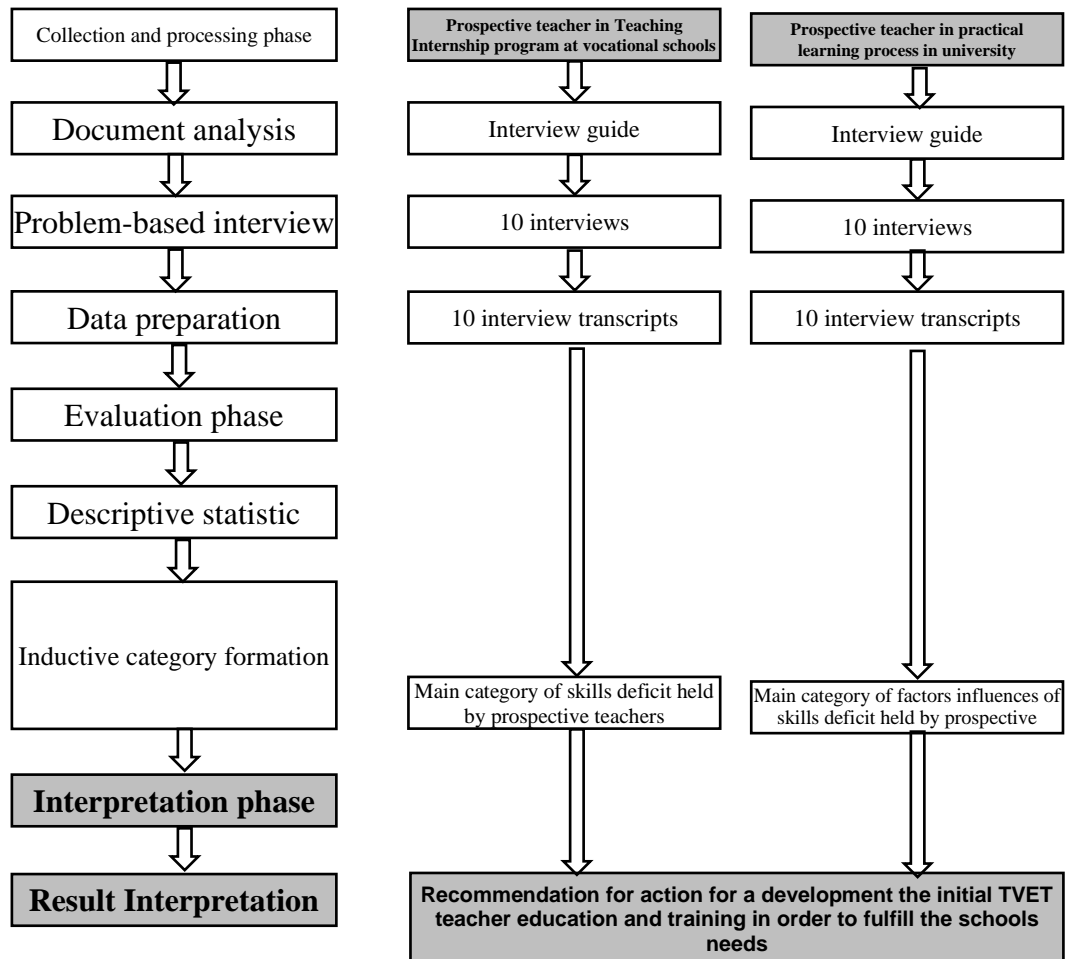
Figure 4.4 Methodological Approaches and Results

The selected data collection and instruments evaluation are described in more detail in the following chapters

4.3.1 Methodic Procedures

The focus of the study is 20 guideline-based, problem-centered interviews with 10 supervisor teachers at secondary vocational schools who have role as supervisor for prospective teachers in teaching internship program and 10 lecturers

at university who have teach the prospective teacher at TVET faculty in Universitas Pendidikan Indonesia (UPI) Bandung-West Java at the time the interview was carried out (Figure 4.4). The investigation and decision on suitable interview and evaluation methods were preceded by elaborations on the state of research and relevant theoretical foundations (Chapter 3) as well as the selection of suitable methods of empirical social research (Chapter 4). The qualitative questioning method of the problem-centered interview, a form of the guided interview, was chosen as the methodological approach of this work. The problem-centered interview enables the inclusion of additional information, also of an informal nature, which only emerges while carrying out the investigation through further discussions. The problem-centered interview method gives the researcher the opportunity to describe the interview situation (postscript) and to record reactions to questions (observation protocol). At the same time, this method gives the interviewer the opportunity to structure the sequence of openly and goal-oriented questions depending on the respective interview situation, so that he can act as a passive listener as well as actively asking (Flick 2002, p. 135: Mayring 1996, p. 53; Witzel 1985, p. 5). The interviews took place in Bandung West Java between February and October 2019.

The contact to the supervisor teachers as well as the lecturers as respondents took place via official letter from chair professor of engineering education of otto von guericke university magdeburg to secondary vocational schools (SMK's) and Universitas Pendidikan Indonesia (UPI), Universitas Pendidikan Indonesia (UPI) was selected as object because the only university in west java have the initial TVET teacher education and training program (Bachelor Degree), in other hand the number of schools selected is up to selection by prospective teacher which is: (1) SMKN 1 Cimahi (2) SMKN 2 Bandung and (3) SMKN 12 Bandung. Through the official's letter and networking has by authors, there were direct contacts to the Dean of Vocational Education and Training of Universitas Pendidikan Indonesia (UPI) and the headmasters of secondary vocational schools, so that the interview requests could be addressed directly. In most cases, this was followed by a direct preliminary discussion with the prospective respondents, in which the objectives of the planned investigation as well as the survey and evaluation methods were

presented. In the next step, the Dean of UPI and SMK's headmasters spoke directly to the supervisor teachers and lecturers. whether they would be available for an interview. A total of ten supervisor teachers (secondary vocational schools' teachers), and ten lecturers (TVET faculty of UPI) agreed to be interviewed. To evaluate the study, all interviews were used. The other interviews conducted before real interview were used as sample interviews to test the interview guidelines, which were then modified and adapted. Most of the problem-centered interviews took place directly in the SMK and UPI in a familiar atmosphere for the supervisor teachers and lecturers.

The interview duration varied between 45 and 60 minutes, with all respondents willing to answer the questions asked. For almost all respondents have experience as interviewee so it was no problem at all for them to handle the situation. Therefore, before each interview, there was a detailed presentation of the objectives of the investigation and a precise explanation of the interview process. The interview partner and interviewer had to sign a data protection contract before conducting the interview to ensure that everyone involved knew what the interview data was used for (Appendix 2: Data protection contract). All interviews were recorded with a recording device with the knowledge and consent of the respondents surveyed and the postscript was made. The recorded interviews were then transcribed (sub chapter 4.3.5). The investigation was divided into two phases. In the first investigation phase, the interviews with the supervisor teachers who supervise the prospective teacher in teaching internship program, which in the second part of the investigation phase the interviews with the lecturers in university who teach the prospective teachers in practical learning process at university were used to inductively develop a catalogue of categories, as shown in (Table 4.3, Figure 4.4). The empirical methods and instruments used to collect and evaluate data are described in more detail in the following chapters.

4.3.2 Data Collection

Instrument is tools that are required to get information. Airasian and Gay (2000, p. 150) stated that instrument is a tool that is used in collecting data. While Arikunto (2011, p. 122) revealed that instrument in collecting data is a tool that is used by researchers to help them in collecting data to make it more systematic and easier. Here, the instrument is researcher herself. Sugiyono (2013) stated that in qualitative research, the instrument is the researcher themselves. Hence, the researcher should be validated by themselves about their ability in conducting research.

Data is information that has been collected by conducting research. To get the reliable data, the researcher must do some techniques for collecting those data. Data collecting technique is an important step in research because the aim of the research is to get the data. Collecting data can be done in any settings, any sources, and any ways. There are five data collecting technique. Those are observation, interview, questionnaire, documentation, and triangulation. In qualitative research, collecting the data mostly is done in participant observation, depth interview and documentation. Sugiyono (2013) stated that the fundamental method relied on by qualitative researchers for gathering information is participation in the setting, direct observation, in-depth interviewing, and documentation review. In this research, the researcher uses interview supported by document review.

1. Interview

Interview is activity that involves interviewer and interviewee where the interviewer will give some questions to be answered by interviewee. Jennings (2005, p. 222) stated "Face-to-face interviews are structured interviews conducted by trained interviewers who use a standardized interview protocol and a standardized set of responses for recording participants' response".

Creswell (2014, p. 242) classify the interview into four types, those types are (1) one-on-one interview, (2) focus group interview, (3) telephone interview, (4) electronic E-mail interview. Thus, in this case, the interviewer must conduct collecting data with doing interaction or communication directly. But it can be conducted face to face or through via electronic. For

additional, Syamsudin and Damaianti (2011) stated that in qualitative research, interview activity has two functions. First function is as main strategy in collecting data like data in the form of interview transcript, and second function is as additional strategy for other techniques like participatory observation, document analysis and photography. Based on the types of interviews above, the researcher uses one-on-one interview. According to him, one-on-one interview is data collection process in which the researcher asks questions and records answers from only one participant in the study at a time. To collecting data of interview, the researcher makes some procedures. Those are (1) preparing the concept of questions that want to be asked to subject and (2) the researcher transcripts the result of interview.

2. Documentation

A valuable source of information in qualitative research can be documentation. Sugiyono (2013) stated that documentation can be written and picture by someone that can be used to obtain information. In conducting documentation method, the researcher can provide magazines, books, documents, etc. The function of documentation method is to make credible the result of observation or interview. In this research, the documentation guide is curriculum in University and Curriculum in Vocational High School in related fields.

4.3.2.1 Data Types

According to Moleong (2002), Data are facts / information / basic ingredients used to compile hypotheses / everything that will examined. Based on the type, data can be classified into two types: (1) primary data and (2) secondary data.

According to Blaikie (2003, p. 18), primary data is new data generated from the primary resources through questionnaire, interviews, or observations to find answers related to specific research project. Whereas secondary data is raw data which already collected by someone else, either for some general information purpose, such as government census or another official purpose or for a specific

research project. In this thesis, primary data are gathered through interviews and secondary data through documents review.

In this study, primary data sources in the form of words were obtained from interviews with predetermined informants involved in the implementation of practical learning carried out at the UPI Vocational Education Technology Faculty in the Mechanical Engineering Department as well as interviews with Teachers in Vocational High Schools who were the places for The Students from the UPI FPTK conducts an internship as a prospective teacher. While the secondary data sources in this study are curriculum data at the UPI Vocational Education Technology Faculty in the Department of Mechanical Engineering and the Vocational Middle School curriculum in the related study program.

4.3.2.2 Data Sources

The data sources used by researchers to complete the data:

a. Informant

Informant is People who give information about everything related to the learning process carried out, the words of the people interviewed are the main data sources. The main informants of this study were lecturers at the UPI Vocational Technology Education Faculty who taught practice as well as teachers who guide and supervise students when conducting internships as prospective teachers in schools.

b. Document

Documentation as a source of data can be used to test, interpret, and even predict a phenomenon. The document used in this study is the curriculum carried out in the practical learning process for students at FPTK UPI and the curriculum carried out in the learning process in Vocational Schools in the related fields.

4.3.2.3 Data Collection Implementation

This research carried out at the Department of Mechanical Engineering Faculty of Technical Vocational Education UPI Bandung and secondary vocational

schools (SMK's) which is the place of internship for students as prospective teachers. The interviews were carried out in 2 batches, during the months of February 2019 and March 2020, the first batch in February 2019 starting on February 04th and ended on February 21st, 2019, and the second batch last in March 2020 starting on March 01st and ended on March 4th 2020. Each of the interviews lasted between about 40 to 60 minutes, depending on the openness of the interview partners and their eagerness to share experiences. In general, the participants' workplace located in Bandung and Cimahi in West Java Province, was chosen as the location for the interviews, where separate, quiet rooms were provided. This allowed the interviewees to feel comfortable in familiar surroundings. Since all the participants' mother tongue was Bahasa Indonesia, this was the language in which they could express their opinion in the best possible way. Therefore, the interviews were conducted in Indonesia. This ensured that the interviewees could respond as openly and honestly as possible. Each interview began with the researcher introducing the respondents to the study. These introductory words can be found in the attached interview guidelines in Appendix 1 - Interview Guidelines. Respondents were then asked to sign a declaration of consent, which is set out in Appendix 2 - Declaration of consent. This document contains all relevant information regarding the purpose of the interview, confidential and anonymous data processing, voluntary participation, and the possibility of opting out. The interviews were later taped for thorough analysis. The files were then rewritten and translated into English. One record is included in Appendix 3 - Transcript of the Interview. After this dissertation has been assessed and presented to the evaluation board, the audio recordings will be deleted. The following steps have been taken to avoid any pitfalls that may arise during data collection. The researcher's goal was to explore some topics only when needed. It was especially important to ensure that the data was not tampered with when asking questions that might lead us in a certain direction. This was also done to prevent the possibility of prejudices related to social need. As the topic under study is quite sensitive, it was also important to formulate questions. Therefore, the author wanted to ask questions in a neutral manner. While carefully considering possible pitfalls, it should be noted that no study, whether qualitative or quantitative, can be completely free of assumptions and biases.

Nevertheless, it is important to be aware of this fact and try to minimize potential pitfalls.

4.3.3 Problem-centered Interview

The Problem-centered interview focuses on reconstructing individual and group-specific forms of meaning. It approaches a certain theme from differing methodological angles by combining an open narrative beginning with prepared questions and other forms of data collection in later stages of the interview. This method tries to bridge the individual constructions of meaning on the one hand and the influence of societal conditions on the other hand (Scheibelhofer, 2005, p. 19). While Witzel (2000, p. 1) described that the problem-centered interview (PCI) is a theory-generating method that tries to neutralize the alleged contradiction between being directed by theory or being open-minded so that the interplay of inductive and deductive thinking contributes to increasing the user's knowledge. The appropriate communication strategies aim firstly at the representation of the subjective approach to the problem, secondly, the stimulated narratives are enriched by dialogues employing imaginative and semi-structured prompts. Theoretical knowledge develops by using elastic concepts that are further developed during the analysis by employing empirical analysis and which will be refined by "testing" empirically grounded "hypotheses" with the data. Methodologically, the concept of a PCI borrows largely from the theory-generating procedure of grounded theory (Glaser & Strauss, 1998; Witzel,2000, p. 1), which on the one hand addresses the critique of a hypothetically deductive procedure in which data can only be collected and verified through steps determined ex-ante in the operationalization. But, on the other hand, this approach leans toward the naive inductive position of "sociological naturalism" (Witzel, 2000, p. 2; Hoffman-Riem, 1980) which is characterized by the interviewer's or scientist's position of general openness concerning the empirical observation. Apart from the previous theoretical knowledge, such a position can be conceptualized as "tabula rasa" (Witzel 2000, p. 2; Kelle 1996). In relation to a PCI, the insight gained through data collection and evaluation must much rather be organized as an inductive-deductive mutual relationship. The inevitable previous knowledge which must thus be disclosed serves in the data

collection phase as a heuristic-analytical framework for ideas for questions during the dialogue between the interviewer and respondent. At the same time, this principle of disclosure is manifest in that through narration what the observed subjects determine to be relevant is stimulated. Theoretical knowledge is generated in the evaluation phase through the application of "sensitizing concepts" (Witzel 2000, p. 2; Blumer 1954, p. 7) which are further developed in the continued analysis and reinforced with empirically grounded hypotheses from the data material. This flexible procedure should ensure that the interviewer's/scientist's view of the problems being addressed does not simply overlap the respondent's and that the theory is not simply superimposed upon the collected data. With those characteristics, PCI is intended to encourage vocational teachers and lecturers to narrate freely.

Witzel (2000, p. 2-4) explains that against this background, three basic principles of PCI can be roughly outlined:

- It is distinguished by a problem-centered orientation towards socially relevant problems which also characterizes the organization of processes of cognition and learning (preceding interpretation). The interviewer makes use of the formerly noted objective conditions of the observed orientations and actions to understand the interviewees' explanations and continue the problem-centered questioning and re-questioning. Action-related contexts of education, occupational and labor-market organization, gender, class, or regional specifics are objective to the extent that individual action is a precondition and that they cannot be altered by individual actors. Parallel to the production of broad and differentiated data material, the interviewer is already working on understanding the subjective view of the respondent while gradually making communication more precisely address the research problem.

- The object orientation emphasizes methodical flexibility in face of the different necessities of the objects being observed. For this reason, the PCI was developed as a combination of methods among which the interview is the most important instrument. It might therefore for instance make sense to prepare for interviews regarding a new research topic by holding a group

discussion (focus group) to obtain a preliminary overview of the range of opinions among the sample to be studied. The biographical method points for instance to developing patterns of meanings in the process of an individual's confrontation with social reality. Also, conversation techniques are applied flexibly: according to the requirements of developing a communication situation focussed on the individual respondent, the interviewer can more frequently use, depending on the varying degree of the respondent's reflection and eloquence, narration, or recurrent questioning in dialogue procedure.

- Process orientation is maintained throughout the course of research and for what I have called "pre-interpretation". If the communication process is focussed reasonably and acceptably on the reconstruction of orientations and actions, the interviewees respond with trust and thus open; they feel that they are being taken seriously. This trust relationship promotes the respondent's capability to remember and motivates self-reflection. As the respondent unfolds his or her view of a problem, so to speak unprotected, in cooperation with the interviewer, during the conversation new results are produced again and again through the cooperation between the interviewer and interviewee. For example, this may lead to alternative aspects on the same topic but from a different perspective, corrections of earlier statements as well as redundancies and contradictions. Redundancies are welcomed to the extent that they often contain new formulations which facilitate interpretation. Contradictions express individual ambivalences and indecision which should be addressed. These might be the result of misunderstandings on the part of the interviewer or an interviewee's errored or lack of memory which can be clarified through repeated questioning. However, they may also reflect problems in orientation, contradicting interests, decision-making dilemmas in the face of contradicting demands of action.

According to Witzel (2000, p. 4) Four instruments allow for and support the carrying out of a PCI: a short questionnaire, interviewing guidelines, tape recordings of the discussion, and a postscript.

1. The short questionnaire serves to collect data on social characteristics (age, parents' occupation, education, etc.). The interview which follows aims to negotiate a subjective view and is thus not obstructed by questions structured by a question-answer scheme. Furthermore, the information gathered thereby and especially in combination with open-ended questions can facilitate starting a conversation. For instance, information on occupational preferences can be used to formulate a question to start the investigation of the transition of youth from secondary schooling into upper secondary education or vocational training.

2. Guidelines are the crucial part of the PCI, together with conversation strategies. Guidelines are a supportive device to reinforce the interviewer's memory on the topics of research and provide a framework of orientation to ensure comparability of interviews. In addition, some ideas for lead questions into individual topics and pre-formulated questions to start the discussion are included. Ideally, they accompany the communication process as a sort of transparency of the background, serving to supervise how individual elements during the discussion are worked through.

3. Compared to a protocol, the generally accepted tape recording of an interview allows for an authentic and precise record of the communication process, which should be immediately fully transcribed. The interviewer is thus able to concentrate completely on the discussion and on observing situation-related conditions and nonverbal expressions.

4. Postscripts are written directly after the interview to complement the tape recording. They entail an outline of the topics discussed, comments on the situative and nonverbal aspects as well as on the interviewee's foci. Beyond this, spontaneous noteworthy remarks on the topic and ideas for the interpretation can be noted which might offer suggestions for the data interpretation. Following the procedure of the "theoretical sample" (Glaser & Strauss 1998), postscripts are also used to create content-related criteria for the selection of additional cases. Contrasting cases can thus be constructed, while similar and contrasting evidence are being sought.

"For this reason, the method is also particularly suitable for preliminary studies that have both a hypothesis-generating and testing character. In a first step, existing assumptions can be exposed to empirical evidence and further insights can be gained at the same time. In a mostly quantitative second step, the hypotheses generated and refined in this way are then validated "(Kurz et al. 2009, p. 465). Due to its three essential characteristics (problem-centering, object-orientation, process-orientation), the problem-centered interview is particularly suitable for answering the research-leading questions of the study (Flick, 2002, p. 135). Problem-centering presupposes "[...] the orientation of the researcher on a relevant social problem [...]" (Witzel, 1985), (vocational teacher and lecturer) for the interview, whereby the individual action and thought patterns of the interviewee should be recorded. The interviewer's knowledge, which was developed and analysed in advance, then makes it possible to understand and visualize statements made by the respondent to possibly ask further (follow-up) questions. The questioning is therefore a specific problem that is recorded from the perspective of the interviewed person. Object orientation describes "[...] that the methods are to be developed or modified based on the object [...]" (Flick, 2002, p. 135) and characterizes the interview process, which in its presentation is essentially based on the object to be researched must relate and not refer to ready-made instruments. The process orientation in the research process and subject understanding (Flick, 2002, p. 135). refers to the entire scientific course of the interview survey and means that the problem is fully analysed, thought through, and understood by the interviewer step by step (Witzel, 2000). Witzel describes process orientation as "[...] the flexible analysis of the scientific problem area, a step-by-step acquisition, and examination of data, whereby the relationship and nature of the individual elements only emerge slowly and in constant reflexive reference to the methods used" (Witzel, 1985, p. 72). The problem-centered interview process model according to Mayring (Figure 4.5) defines five work phases with problem analysis (1), guideline construction (2), pilot phase including guideline testing (3), interview implementation including exploratory, guiding, and ad-hoc questions (4) and recording (5) (Mayring, 1996, p. 53). During the pilot phase, trial interviews are held, which serve to review the

individually created guidelines and to create possible exploratory, guiding, and ad-hoc questions as well as practicing free and relaxed speaking during the interview.
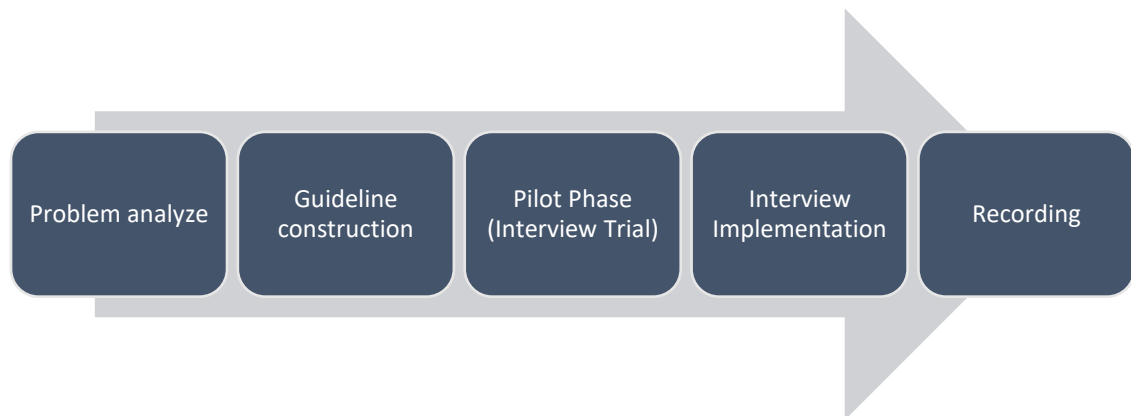
Figure 4.5 Problem-centered Interview Process Model

Source: Mayring, 1996, p. 53

The process of the problem-centered interview is structured according to a systematic but at the same time flexible questionnaire, which enables the interviewer to ask questions and additional questions in the conversation. In the problem-centered interview, the conversation partner should be able to speak and argue freely, as in an open exchange of views (Lamnek, 2005, p. 364). The central focus is on the problem concerning the respondent's experiences, perceptions, and reflections, which the interviewer must refer to again and again in the interview (Mayring, 2002, p. 67). The interview aims at the subjective view of the participants on the kind of skills deficit and factors influencing the skills deficit held by prospective teachers. An open entry question should enable the respondent to start the conversation more easily. To keep the concentration of the respondent and the interviewer high, the interview should be recorded with the consent of the respondent and then transcribed. The guide not only serves as a memory aid for the interviewer but also ensures the comparability of the interviews. "Ideally, the guideline accompanies the communication process as a kind of background slide that serves to control the extent to which its elements have been dealt with in the course of the conversation" (Witzel 2000, p. 4). In the interview, the story-generating and the understanding-generating communication strategy can be used with two conversation techniques that can be used flexibly. With the help of the

understanding-generating strategies of specific probing (reflections, questions for understanding, confrontations), the interviewer's understanding of connections is deepened again (Lamnek, 2005, p. 365). This is where a rough re-interpretation and evaluation of the interviewer begins, whereby the interviewer can compare and/or correct his first interpretations with the respondent (Witzel, 2000, p. 5).

In this study, even though the respondents have long experience, the narrative-generating communication strategy was mainly used, as the interview partners had to be encouraged to talk freely about their knowledge about the subjects and the associated life experience, rather than the interviewer's problems of understanding. Therefore, this communication strategy is briefly described in more detail. Through an openly formulated initial question, which nevertheless points to the problem to be examined, the respondent will be encouraged to formulate his subjective view of the problem with his own words and creative means.

The question-answer game most expected by the respondent is dispensed with (Witzel, 2000, p. 5). If key topics from the individual interview guidelines have not yet been addressed during the interview, ad hoc questions can be used. These questions are formed spontaneously and from the keywords of the guideline to ensure that the various interviews can be assessed and evaluated comparatively about their subject areas. For example, concerning the present study, an ad hoc question was: "regarding Your opinion about the curriculum development, can You describe more detail about the step of curriculum development?" By asking this question, the interviewer details, and structures the ongoing interview. Questions in the sense of a general exploration for detailing what has been said so far can also be used here (Witzel, 2000, p. 5). "A 'luring out' of concrete examples of experience or biographical episodes stimulates the ability to remember, clarifies abstract, missing or unclear terms and establishes concrete references to the contextual conditions of action" (Witzel, 2000, p. 4). In the run-up to the interview, an interview guide should be developed as a memory aid, which shows the introduction to the topic and the rough formulation of the respective open questions (Appendix 1: Interview guide). The guideline contains the interviewer's theoretical and scientific knowledge, including research-relevant topics, objective and reliable

assumptions made by the interviewer. With the help of an interview guide, which is composed of questions and narrative stimuli, the problem of the topic is presented. For the creation of the interview guidelines (sub-chapter 4.3.4 Construction of the interview guidelines), theoretical prior knowledge, which is based on a theory-based analysis of the topic, is used as a rule.

The elaborated guideline characterizes the basis of the interview and confronts the respondent with the topic. Not all prepared and pre-formulated questions need to be the subject of the interview. Rather, the partial standardization guarantees that it is possible to deviate from the guidelines during the conversation. In this sense, the interview guide serves as a memory aid for the interviewer to ensure that all research-relevant aspects are discussed and addressed. At the beginning of the problem-centered interview, it is therefore of great importance that the question is explained to the respondent so that he can get an idea of the topic to be treated. It should be emphasized that the individual point of view of the interviewee is of great interest. Various narrative and understanding-generating communication strategies can be used to promote the narrative flow or to incorporate questions of understanding. The narrative-generating communication strategies include, above all, starting a conversation, general explorations, and ad-hoc questions.

The communication strategies that generate understanding include above all specific explorations with reflections, questions of understanding, and confrontations within the interview implementation (Lamnek, 2005, p. 365). For a successful start to the conversation, the previously worked out introductory question must stimulate storytelling and direct the interviewee's concentration on the problem area. "A pre-formulated introductory question is a means of centering the conversation on the problem under investigation. At the same time, the question should be formulated so openly that it seems like a blank page for the interviewee, which he can fill in his own words and with his creative means "(Witzel, 2000, p. 4). Concerning to this study, such a pre-formulated introductory question was: "You are currently teaching at secondary vocational school (SMK) in mechanical engineering subject. Can you tell us your experience? "After the first narrative phase, the general exploration begins, it serves to gradually reveal the subjective

views of the interviewer. On this occasion, the information already mentioned will be taken up and formulated in response to these inquiries. With the help of the inquiries, the respective facts can be determined in more detail to get more precise information on the problem. In contrast to the quantitative and standardized interview, the processing of the individual subject areas can vary.

The interview guide helps the interviewer to give an overview of which subject areas have already been discussed and which can still be addressed. The interview guidelines are individually adapted to the conversation based on the respondent's statements, i.e. the interviewee indirectly determines the course of the guidelines. Meanwhile, however, the interviewee does not know the subject areas of the guideline (Witzel, 2000, p. 3). In a problem-centered interview, the interviewer decides, depending on the communication situation, whether to rely more on narration or supportive questions. "If the communication process is centered on the reconstruction of orientations and actions in a sensitive and accepting manner, trust and openness are created in the respondents because they feel that their problem view is taken seriously (Witzel, 2000, p. 3). The interview and the course of the conversation develop, and the respondents start telling stories, the ability to remember is promoted and self-reflection begins.

-The problem-centered interview selects the linguistic approach to elicit the question against the background of subjective meaning, formulated by the subject himself.
-To create a situation of trust between the interviewer and the interviewee.
-The research starts with concrete social problems, the objective side of which is analysed beforehand.
-The interviewees are directed to certain questions by the interview guidelines but should respond to them openly, without specifying the answer.

Figure 4.6 Basic Idea of Problem-centered Interview

Source: Mayring, 1996, p. 51

The interviews are then completely transcribed (Witzel 2000, p. 1-9). The data obtained from the interviews are evaluated and interpreted about their categories to establish a reference to the research interest. In summary, Figure 4.6 visualizes the basic methodological ideas of the problem-centered interview.

4.3.4 Construction of Interview Guidelines

As already described, almost all qualitative interview procedures (group of guideline interviews) use guidelines for interviewing and empirical data collection (Mayring, 2010). "The decisive differences are more in how extensive, detailed and formulated this is, what role it is assigned in the survey situation (supplementary or central, structuring or as an aid for the interviewer, etc.) and how the interviewees should deal with the guidelines . [...] Basically, the consequence and attempted solution of the tension between structuring necessities on the one hand and an interest in as much as possible, openness and spontaneity on the other can be seen in guidelines "(Ullrich, 1999, p. 12). The guideline within the problem-centered interview serves the interviewer not only as a memory aid in the sense of a background slide for control, but also ensures the comparability of the interviews conducted (Witzel, 2000, p. 4).

Table 4.4 Criteria of the Guideline Construction

Theoretical Relevance	Why is the question asked (or the stimulus given)?
Content Dimension	what is asked for?
Formulation	Why is the question phrased in this way (and no other way)?
Structural Dimension	Why is the question / block of questions at a certain point?

Source: Ullrich, 1999, p. 14

It is therefore very important for the further survey and research process that construction rules are observed in the construction of the guideline, which ensure a certain qualitative standard of the guideline (Ullrich, 1999, p. 14). The guideline was drawn up based on the requirements formulated (Helfferich, 2005, p. 158-165). In addition to observing the general criteria for the construction of a guideline, the character of each individual question formulation must be questioned and justified (Ullrich, 1999, p. 15). Ullrich differentiates the questions according to technical aspects and content-related objectives (Ullrich, 1999, p. 15).

Table 4.5 Differentiation of Questions According to Type of Question

Questions about technical aspects	Questions with content-related objectives
Information and filter questions	Knowledge questions
Main questions and dependent questions	Narration requests
Questions about starting the conversation	Requests for comments
Reruns and resumptions	Justification requests

Source: Ullrich, 1999, p. 15

The technical aspects of a question (including technical questions) are required to handle the guideline (Table 4.4) so that the interviewer has, among other things, the ability to intervene, control or vary the interview or the interview situation in certain interview situations (Ullrich, 1999, p. 15). The content-related direction of a question or what type of text should be generated with it (Table 4.5), characterize another differentiation possibility (Ullrich, 1999, p. 16). Above all, the requests for reasons are a special feature here, as they are explicitly excluded in most of the qualitative interview procedures (Mayring, 2010). The problem-centered interview is an exception here. Dresing and Pehl, 2018 provide some pointers about the formulation of the questions (Table 4.6) to ensure that the interviewee is positively animated and stimulated to talk in detail about the desired topics (Dresing and Pehl, 2018, p. 10-11). The introductory question represents a general question that does not yet explicitly direct the respondent's attention to the research object to generate an initial narrative stimulus (Witzel, 1985). The final question is chosen in such a way that it encourages the interviewee to give an outlook (Helfferich, 2005).

The interview guidelines for this study were developed based on these criteria (Appendix 1: Interview guidelines).

Table 4.6 Recommended and not Recommended Types of Question

Recommended	Not Recommended
Text generation Questions: „Please describe ... ", „Can You Tell us ..."	Closed questions: „Were you satisfied or dissatisfied with it? " Better: How did you find that?" ; „How satisfied were you with it?"
Sustaining questions: Can you think of anything else related to? "; How did it go from here?"	Yes-no questions: „Did you prepare the learning plan? " Better: „How did you develop the learning plan?"
Process-oriented questions: How did the learning process implement, is that ...? "	Query reasons: „Why did you do that?" Better: „And how did it come about that ...?"
Open questions: reflect on your own concepts in the question. Provocative questions: if at all, use them sparingly, deliberately, and only towards the end or when the interview dynamic is slow	Suggestive and evaluative questions: „there is no third-party certification at your faculty?". „And how the certification process conducted if you do not implement the third-party certification ...?"
Short, understandable questions Answerable questions	Complicated questions, series of questions that are beyond the knowledge of the respondent: „What did your boss think about it? " Main research question direct and abstract: „What kind of skill deficit they have?"
Soft questions: „Would you please tell me what experiences you have had so far with shopping on the Internet ...? " Toning particles: yes, sometimes, so. Verbs, however, are not in the subjunctive form	Questions in written language or „how shot from the pistol. "
Fact queries belong at the end of the interview	Questions of fact too early ruin the self-sufficient communication process
As far as possible, the respondents have the right to speak in monologues	

Source: Dresing and Pehl 2018, p. 10-11

4.3.5 Transcription the interviews result

Transcription can be a very useful step in the research analysis phase because it can provide researchers with very important insights about empirical data. Obviously, in the research process, the researcher may always transcribe the further necessary text part of the interview to altering, change and add the necessary further research data. In this paper, the results of all 20 interviews were fully transcribed, regardless of the importance of all text parts in the question section. Jovchelovitch and Bauer (2000) believe that the level of detail of transcription depends on the purpose of the research. In this paper, the researchers considered paralingual features, pauses, type intonation, accented words and syllables, and the tone of the informant when he or she tries to provide his or her translation with a unique tone (such as satire). These are the symbols used in this dissertation to transcribe the interview:

Table 4.7 Transcription Rules

Topic	Representation in the transcript	Explanations
Paragraph	End of a topic. [EMPTY LINE] New topic	Subdivide longer interview passages (max. 2-3 paragraphs per page).
Anonymization	Teacher = TVS Lecturer= UL	TVS (1,2,3,4,5,6,7,8,9,10) UL (1,2,3,4,5,6,7,8,9,10)
Omitted letters	What's that?	Replace omissions with apostrophe (')
Emphasis	UNconditional	Capitalisation of the stressed syllable
Stretch	Hoooowww?	
Upper and lower case	I would like to ask my colleague	
Interfunction	,.;:!?	Conventional use
Comment	(SIGHS) (DRINKS) (SMOKES) (CLEARS THROAT)	Situation description in brackets and capital letters
Phonetic spelling	It's not a problem	orthography

Pauses (separate from the word with blank lines)	*	For a short break
	**	For longer break
	3	With length indication (in sec.)
Simultaneous speaking	#and went home#	Marking the passages in double crosses
	#When are you#	
Uncertainty	(FROM # NOT CLEAR)	Comment with reference before ambiguous text passage
Incomprehensible textpassages	(10 SEK.UNV)	In the commentary with time or approximate text
	(UNV.;ABOUT: ...)	
Looping	There da=vid knocked	Connect the word with this sign (=).
Word and sentence break	Photo app//photo camera	Append these characters to a broken word, sentence (//)
Quote	He said to me: ,,What do you mean?"	Use inverted commas (,,")

Source: Kuckartz, 2010, p. 38-47

Dresing et al. (2015, p. 21-22) described that, transcription (lat. trans-scribere = to rewrite) is the transfer of an audio or video recording into written form. A transcript usually originates from simply typewriting the recorded content. Typically, conversations, interviews, or dictations are subject to transcription. Verbal statements are ephemeral and what we remember from conversations is often sketchy. Transcription aims at overcoming this problem by supporting memory. In a transcript, speech is registered in writing and therefore made accessible for analysis. One the one hand, one wants to represent speech in as much detail and in as multifaceted a way as possible in order to provide the reader with an accurate impression of the conversation and thus facilitate its reconstruction. On the other hand, too many details and too much information can make a transcript difficult to read. There is thus a tension between the opposing poles of accurate representation and practical limitations.

The transcription process is obviously paradoxical: with the aspiration to accurately represent the multi-faceted verbal discourse, you create a written text that is a linear, one-dimensional document. Ultimately, producing a transcript is a dilemma oscillating between realistic representation and practically possible presentation or compression. Hence the challenge of transcription lies in knowing this discrepancy and in dealing with it as adequately as possible with regards to your methodology and topic. Anyone transcribing or working with transcripts should be aware that a transcript will never be able to fully represent the interview situation. Too many elements factor into communication and it is impossible to transcribe them all. Even a transcript closely guided by phonetics neglects non-verbal aspects such as door, room and time setting, visual aspects, facial expressions, and gestures. As one cannot include everything, one must focus on certain aspects.

These aspects will vary depending on your research objective or intended use of the transcript or situation, respectively. In simple transcripts, paraverbal and non-verbal elements of communication are usually omitted. Dialect and colloquial language is approximated to standard language. The focus of simple transcripts lies on readability. It is easier to learn to produce such a transcript and the transcription takes less time. These transcription conventions prioritize content. Kuckartz et al. (2008) provide "deliberately simple and quickly attainable transcription rules which considerably "smoothen" speech and set the focus on content".
From Dresing et al. (2015, p. 28) The underlying transcription rules :

1. Transcribe literally; do not summarize or transcribe phonetically. Dialects are to be accurately translated into standard language. If there is no suitable translation for a word or expression, the dialect is retained.
2. Informal contractions are not to be transcribed, but approximated to written standard language. E. g. "gonna" becomes "going to" in the transcript. Sentence structure is retained despite possible syntactic errors.
3. Discontinuations of words or sentences as well as stutters are omitted; word doublings are only transcribed if they are used for emphasis ("This is very, very important to me.") Half sentences are recorded and indicated by a slash /.

4. Punctuation is smoothed in favor of legibility. Thus short drops of voice or ambiguous intonations are preferably indicated by periods rather than commas. Units of meaning have to remain intact.

5. Pauses are indicated by suspension marks in parentheses (…).

6. Affirmative utterances by the interviewer, like "uh-huh, yes, right" etc. are not transcribed. EXCEPTION: monosyllabic answers are always transcribed. Add an interpretation, e.g. "Mhm (affirmative)" or "Mhm (negative)".

7. Words with a special emphasis are CAPITALIZED.

8. Every contribution by a speaker receives its own paragraph. In between speakers there is a blank line. Short interjections also get their own paragraph. At a minimum, time stamps are inserted at the end of a paragraph.

9. Emotional non-verbal utterances of all parties involved that support or elucidate statements (laughter, sighs) are transcribed in brackets. 10. Incomprehensible words are indicated as follows (inc.). For unintelligible passages indicate the reason: (inc., cell phone ringing) or (inc., microphone rustling). If you assume a certain word but are not sure, put the word in brackets with a question mark, e.g (Xylomentazoline?). Generally, all inaudible or incomprehensible passages are marked with a time stamp if there isn't one within a minute.

10. The interviewer is marked by "I:", the interviewed person by "P:" (for participant). If there are several speakers, e.g. in group discussions, a number or a name is added to "P" (e.g. "P1:", "Peter:").

11. The transcript is saved in rich text format (.rtf file). Name the file according to the audio file name. E. g. interview_04022011.rtf or interview_smith.rtf.

You can reach a higher degree of detail by including the following additional rules. You should only choose the rules that are suitable for your data and scope of analysis. Naturally, it will then take longer to complete the transcript.

Additional rules

1. Discontinuations are marked by /: "I was worri/ concerned." Word doublings are always transcribed.

2. Pauses are indicated by suspension marks in parentheses, corresponding to the pause length from one second (.) to three seconds (…), and the (number) of seconds for longer pauses.

3. Affirmative noises und fillers ("uh-huh, um, yeah") are transcribed. All the participant's utterances, including fillers, are transcribed.

4. Speech overlaps are marked by //. At the start of an interjection, // follows. The simultaneous speech is within // and the person's interjection is in a separate line, also marked by //.

5. Dialects are written as they are spoken.

Example sample transcript :

I: So, what do you expect from your new field of study in Hamburg?
00:01:01–0
P: Well, first and foremost I want to learn a lot of new things about criminology and the legal branch. Well, my major was educational science, and my minor subjects were sociology and peace and conflict studies in MARBURG. And now, I would like to get to know the legal side of it better, and meet new people and experience new things. And I also want to (explore?) a completely new profession. #00:01:26-1#

I: Okay, and what you expect regarding collaboration //between teenagers?// #00:02:11-2#

P: //SO far, I don't have// any concrete ideas and for the profession or for criminologists, there is no, a specific profession or professional (…), how do you say, doesn't exist, well a profession, and then also you can do a LOT of different things. #00:02:32-4#

Simple transcript	Complex transcript
S1: …or whether they'll get divorced after all.	S1: =<<dim> or WHEther they'll get divorced ↑`after all.>
S2: Hm. (…)	S2: ˘hm, (- -)
S1: This is still. (…) . It is a transition.	S1: <<pp> this is still - > ((breathes out for 2.1 sec)) <<p> t'is a ↑`transition.>
S2: Our former neighbors, they are a good example for this. (…) Married for thirty years (…) the last kid was finally out of the house, took off to study, (…) left, you know, to Berlin.	S2: our former neighbors ↑` they are a good example for this  (- - -)  err (- - -)  ↑ married for THIRty years °hh  the last kid (.) `finally outta-the ´HOUSE, took off to STUdy, (-) ´LEFT, =´you know, °h to ber´LIN, °h

Figure 4.7 Example of Simple and Complex Transcript.

Source: Dresing et al, 2015, p. 25

4.3.6 Translation and Language Barriers

A language is a powerful object of analysis concerning problem-centered interviews. Hence, any translation of the collected data must be accurately and cautiously conducted. Tarozzi (2013, p. 6) precisely reminds us that the semantic power of a translation that ignores cultural settings is impoverished, and it loses dramatically its semantic power. Hence, in this research project, interviews were conducted in Bahasa Indonesia, given that its respondents are Indonesians, and the research location is also located in Bandung and Cimahi, Indonesia, and that the researcher is also a native speaker of the target language.

It is more appropriate for researchers to use the language of the informant to obtain an understanding of their life history, given that using a foreign language could be an impediment for one is to provide a fluent narrative or even an understandable one. Larson (1998, p. 52) reminds us that the term "cross-language research' describes studies in which a language barrier is present between

qualitative researchers and their participants. This research, however, does not have this problem once the researcher speaks the language of the informants and can also use the original language for analytical purposes. However, for scientific as well as orientation purposes, and aiming at the publication of this dissertation, the interviews had to be translated from Bahasa Indonesia into the English language. Temple and Young (2004, p. 168) claim that the situation where the researcher is fluent in the language of communities, she is working with is rare. It offers opportunities in terms of research methods that are not open to other researchers in cross-language research.

The interviews conducted in this dissertation were translated by the translator and evaluated by author of this research, though, who is also fluently in English, therefore, being able to carry out the translations in this cross-language research project. However, it must not be forgotten that translating interviews from one language to another is not merely an easy process of replacing words of one idiom with those of the other. House (2006, p. 344) states that it is necessary to bear in mind that that translation equivalence is extremely complex, as it is socially and historically determined, and affected by the constraints of specific languages, linguistic and social conventions, as well as the translator's comprehension, creativity, and implicit theories. Perhaps one of the biggest concerns regarding the translation of data used in empirical studies is the type and precision it. Hence, the translations done in this research were particularly preoccupied with a verbum pro verbo translation. However, this direct translation can also impede a full comprehension of the sense behind the message being conveyed by the informant. Therefore, adjustments had to be made to make the textual sections comprehensible. In addition, of course, these sections were properly transcribed and translated with the aim of providing enhanced transparency of the development of core and sub-categories within the framework established based on the data collected. There are a few examples of a literal translation and of the translation done in this research, which was concerned with both issues regarding equivalence and comparability of meaning, for the reader to have a general idea of the modifications needed to be done in the textual sections.

Example taken from TVS-01 interview:

This is the textual section in the original language – Bahasa Indonesia:

di mata pelajaran saya, para mahasiswa ini harus mengajar di kelas teori serta mengajar di bengkel untuk pembelajaran praktik Pak *2* […] jadi mereka diharuskan untuk mengajar teori dan praktik selama program magang ini." […]

This is the literal translation word by word:

[…] „in my subject, these students must teach theory class as well as teach in workshop for practical learning sir *2* […] so they are required to teach theory and practice during this internship program." […]

4.3.7 Data Verification Technique

In qualitative research, data can be categorized good data if the data are valid. To get validity of data, Creswell (2014, p. 251-252) classified the validity of data into eight strategies. Those are:

1. *Triangulate different data sources of information by examining evidence from the sources and using it to build a coherent justification for themes.*
2. *Use member checking to determine the accuracy of the qualitative finding through taking the final report or specific descriptions or themes back to participants and determining whether these participants feel that they are accurate.*
3. *Use rich, thick description to convey the findings.*
4. *Clarify the bias means the researcher brings to the study.*
5. *Also present negative or discrepant information that runs counter to the themes.*
6. *Spend prolonged time in the field.*
7. *Use peer debriefing to enhance the accuracy of the account.*
8. *Use an external auditor to review the entire project.*

In this research, the researcher uses triangulation technique. Cohen et al (2007, p. 141) stated "Triangulation may be defined as the use of two or more methods of data collection in the study of some aspect of human behaviour". Thus, triangulation technique means the researcher uses two or more techniques in collecting the data to get validity. The purpose of triangulation is to increase the credibility and validity of the findings. Further, Turner and Turner (2009, p. 2-4) stated that there are four techniques in triangulation. Those are: (1) Data triangulation, (2) investigator triangulation, (3) methodological triangulation, (4) theoretical triangulation.

1. *Data triangulation*

    In source triangulation, the researcher uses many sources or participants to get the accuracy of data. Data triangulation entails obtaining data from different sources, or at different times or under different conditions, but would not include studies where these comprise the independent variables in an experiment

2. *Investigator triangulation*

    Investigator triangulation means technique that uses more than one researcher in collecting and analysing data. From some researcher's view in interpreting information and collecting the data, the validity of data can be increased.

3. *Methodological triangulation*

    Methodological triangulation refers to researcher uses more than one method in the research. Cohen et al (2007, p. 142) explained "Methodological triangulation is using the same method on different occasions or different methods on the same object of study". Thus, methodological triangulation is making different method to get validity of data.

4. *Theoretical triangulation*

    Theoretical triangulation means the researcher compares the data finding with perspective theory that is relevant. Here, the researcher is demanded to have expert judgment to compare the finding of research with the certain theory.

From those types of triangulations, the researcher uses methodological triangulation to get validity of data. Besides, the researcher collects the data by using interview guide which is supported documentation review which can give evidence if the participants are people that is proper to be used as subject of research.

4.3.8 Data Analysis

The data analysis technique used in this study is qualitative analysis by following the theoretical concept of "content analysis of Philip Mayring's model." The definition of content analysis is "an in-depth analysis that can use quantitative and qualitative techniques on messages using scientific methods and is not limited on the types of variables that can be measured.

The starting point for the conception of the qualitative content analysis was the desire for a comprehensible methodology for the systematic interpretation, in the sense of a theory-and rule-guided text understanding, of documents through the use of analysis steps unregulated (Mayring, 2010, p. 48). The strengths of the communication-scientific content analysis (theoretical guidance, rule guidance, communication model, category-orientation, product criteria) (Mayring, 2000, p. 6). A distinction can be made between qualitative and quantitative content analysis, whereby Früh notes that this strict distinction is misleading, since qualitative content analyses also contain quantitative elements, but this should be maintained for better understanding (Früh, 2004, p. 25). "Because qualitative content analysis should be understood to mean techniques that place particular value on the description of the qualitative analysis steps without excluding quantitative steps" (Mayring, 2010, p 101). While the quantitative approach involves counting the frequency beforehand defined (manifest) terms according to precisely defined rules and the representation of those with the help of statistical measures, the qualitative content analysis, building on the quantitative, tries to go one step further and to uncover the meaning structures behind these terms (Mayring, 2002; Mayring, 2010, p.32) With the objective sense (1), intended sense of expression (2) and document sense (3). "Becker and Lissmann speak of different layers of content here (Topics and train of thought as primary content, latent content, explored through

interpretation in the context of the text en) "(Becker and Lissmann, 1972; Mayring, 2000, p. 1).

The aim of this analysis method is to compress the complexity and abundance of the empirical data material into essential elements and still maintain a high level of quality of the informative value of the basic data (Lange, 2008, p. 51).

Therefore, the qualitative content analysis (summary, structuring) is ideally suited for evaluating the interview material collected about kind of skills deficit in the activity of teaching internship at secondary vocational schools and for deriving possible influencing factors on the skills deficit owned by prospective teachers. The procedure and methodology of qualitative content analysis (Table 4.8) is based on the classic features of general content analysis (Kuckartz, 2010; Mayring, 2010, p. 29). The qualitative content analysis assumes that empirical material has already been collected and evaluated according to previously defined rules. "In order to decide what can be interpreted from the material at all, a precise analysis of this starting material must take place at the beginning" (Lamnek 2005, p. 518; Mayring, 2010, p. 52). This involves the definition of the material (1), analysis of the development situation (2), and formal characteristics of the material (3), which have a strong relationship to source studies or source criticism from the historical sciences (Mayring, 2010, p. 52). In the next step, it must be determined from which perspective the researcher interprets, i.e. which specific research question is brought up to the material (Table 4.8). To develop the question, the two phases of the analysis (1) and the theory-based differentiation of the question (2) (Lamnek, 2005, p. 518; Mayring, 2010, p.56).

Table 4.8 Features of Content Analysis

Feature	Description
Communication model	• Communication scientific anchoring • Always consider the empirical material in its communication context • Establishing a relationship between the communication process and the conclusions from the material analysis • Interpretation of the text within its context • Examination of the material for its origin and effect
Rule guidance	• Systematics based on predefined rules of text analysis • Central point: definition of a process model • Adaptation to the subject, material, and question • Every analysis step of the evaluation process can be traced back to a well-founded and tested rule • Definition of content analysis coding, context, and evaluation units
Category orientation	• Specification of the analysis objectives in categories • System of categories as a central instrument of analysis • Enabling intersubjective verifiability and reliability assessment • Central point: category construction and justification
Object reference	• Connection to the specific subject of the analysis • Procedure not in the sense of a technology that can be arbitrarily transferred to another object • Proof of the adequacy of the respective material
Pilot studies	• Avoidance of standardized instruments (reference to the subject) • To do this, test the procedure and the category system in a pilot study • Documentation of the tests in the research report (intersubjective verifiability)
Theory guidance	• Inclusion of theoretical arguments

	• Constant systematic comparison of the state of research on the examined subject and comparable subject areas in all procedural decisions • Validity takes precedence over reliability (substantive arguments take precedence over procedural arguments)
Quantitative analysis steps	• Attempt to combine qualitative and quantitative process steps (where can quantitative steps be used sensibly and justified?) • Important for generalizing possible results • e.g. frequency of cases or categories • Central points: Careful justification of the effort and detailed interpretation of the results
Quality criteria	• Assessment of the results according to objectivity, reliability, and validity • Criterion of "intercoder reliability" (several content analysts process the same material independently of each other) • Understand and interpret "unreliability" to modify and adapt analytical instruments (search for arguments for validity and reliability)

Source : Mayring, 2010, p. 48-52

The special feature and thus the strength of the qualitative content analysis in contrast to other methods of interpretation is characterized in that it parses the actual analysis into individual meeting predefined and established, interpretation steps so that their inter subjective testability, traceability and adaptability secures to other objects (Mayring, 2010, p. 59). For this it is necessary (Table 4.9) that analysis units are defined in advance. The analysis units primarily serve to specify the qualitative analysis steps (Mayring, 2010, p. 59).

Table 4.9 Analysis Units for Precision (Content Analysis)

Analysis Unit	Description
Coding Unit	Smallest material component of the evaluated and smallest text part that can be classified in a category.
Context Unit	Largest text that can be classified in a category
Evaluation Unit	Order of the text parts in the evaluation

Source : Mayring, 2010, p. 59

Table 4.10 Rules of Interpretation (Z-Rules)

Z rule	Description
Z1: paraphrasing	Z1.1: Delete all text components that do not (or have little) content, such as decorative, repetitive, clarifying phrases! Z1.2: Translate the content-bearing text passages to a uniform language level! Z1.3: Transform it into a grammatical short form!
Z2: Generalization to the level of abstraction	Z2.1: Generalize the objects of the paraphrases on the defined level of abstraction so that the old objects are implied in the newly formulated! Z2.2: Generalize the sentence statements (predicates) in the same way! Z2.3: Leave the paraphrases that are above the desired level of abstraction! Z2.4: Use theoretical assumptions in case of doubt!
Z3: first reduction	Z3.1: Delete paraphrases of the same meaning within the evaluation units! Z3.2: Delete paraphrases that are not considered to be essential to the content on the new level of abstraction! Z3.3: Accept the paraphrases that are still considered to be central to the content (selection)! Z3.4: Use theoretical assumptions in case of doubt!
Z4: Second reduction	Z4.1: Combine paraphrases with the same (similar) subject and similar statement to form a paraphrase (bundling)!

	Z4.2: Combine paraphrases with several statements about an object (construction / integration)! Z4.3: Combine paraphrases with the same (similar) object and different statements to form a paraphrase (construction / integration)! Z4.4: Use theoretical assumptions in case of doubt!

Source: Mayring, 2010, p. 70
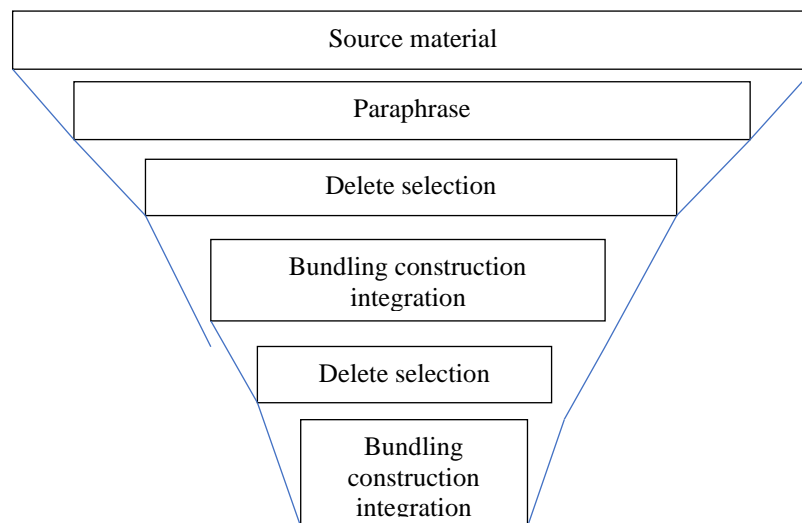
Figure 4.8 Material Reduction Through Consolidation.

Source: Mayring, 2015, p. 85

The use of content analysis must have a phenomenon of communication that can be observed. The researcher first formulates exactly what will be studied. As well as all actions taken are based on these objectives. The next step is to select the unit of analysis under study, choose the object of research that is the target of the analysis. If the object of research relates to things in general that exist in content analysis (verbal data), it is necessary to mention the place, date, and means of communication concerned. The analytical approach with a model like this is not much different from other qualitative approaches. From the data that has been formulated, it will be analysed properly to produce the right research as well, below is the content analysis framework:
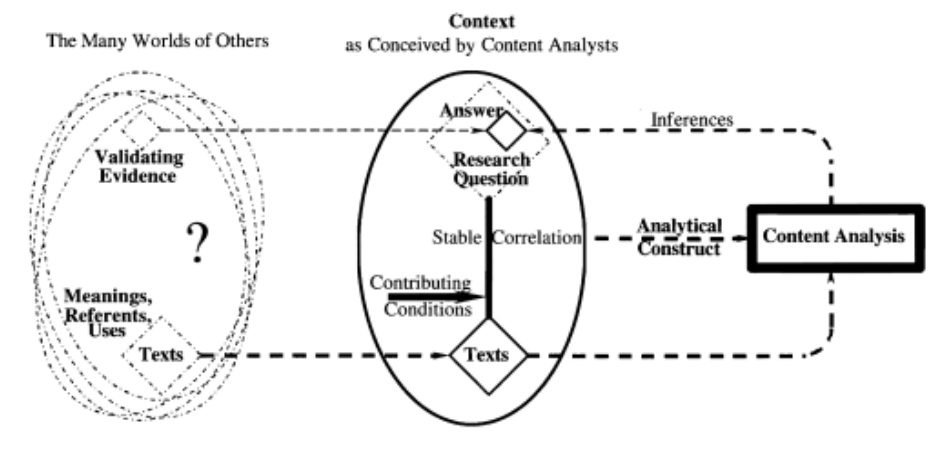
Figure 4.9 Content Analysis Framework

Source: Klaus Krippendorff, 2004, p. 30

The two biggest parts of the picture above are the real data context, the real symptoms and the conditions that surround them. While the context created by the researcher is a part that is built by the researcher based on the target analysis, various factors that influence it. Both contexts will influence content analysis which will later be described in the analysis that will be made. In the qualitative content analysis procedure, there are two central approaches to development: (1) inductive category development and (2) deductive category application. In this study the approach used was inductive category development. Inductive category development within the framework of a qualitative approach, questions about how the categories are defined, how the categories are developed. This will be a concern, to develop aspects of interpretation, categories, as close as possible to the material, to form them in terms of the material. The main idea in the content analysis procedure for the inductive category development is to formulate a criterion and definition, starting from the theoretical background and research questions, determining the calculated textual material. Material is done through categories that are temporary and step by step.

4.3.8.1   Analyse form: Inductive Category Formation

The analysis form "inductive category formation" (Figure 4.10) belongs to the basic form "summary" of the qualitative content analysis (Mayring, 2015, p. 68). The qualitative content analysis requires "[...] to develop the evaluation aspects close to the material, out of the material" (Mayring, 2000, p. 3). The inductive category formation according to Mayring requires that the categories are formed from the recorded interview data. He derives "[...] the categories directly from the material in a generalization process without referring to previously formulated theoretical concepts" (Mayring, 2010, p. 83). For the research and evaluation process, this means that appropriate categories for subdividing the text materials can only be developed after the interview has been carried out. This allows the collected text materials to be reduced to a clear form and presentation, which then includes the most important and therefore most research-relevant content and presents a clear picture of the interview data (Mayring, 2010, p. 83). Where the evaluation categories should come from, however, is not explicitly considered in the literature on classical content analysis (Mayring, 2000, p. 3). The inductive approach or inductive category formation is particularly suitable in the context of qualitative approaches (Kuckartz, 2010, p. 60; Mayring, 2002; Mayring, 2010, p. 83). According to Mayring, inductive category formation is mainly used when not all of the collected text material, but only essential text segments that are meaningful for answering the research questions, are to be processed (Mayring, 2010, p. 66). In contrast to the process known as "open coding" from "Grounded Theory" (Glaser and Strauss, 1998), the process of creating categories in qualitative content analysis can be characterized as more systematic because "[...] the same logic, the same reductive procedures are used that are used in the summary content analysis" (Mayring, 2010, p. 84). According to Kuckartz (2010, p. 96) the summary content analysis is less theory-oriented, much more descriptive, and the most inductive approach. Figure 4.10 shows the process model of inductive category formation. "The basic idea, derived from the question of the study and theoretically justified, is to establish a definition criterion that determines which aspects of the material should be taken into account and then to work through the material step by step" (Mayring, 2000, p. 3). This means that a selection criterion, which excludes

the inessential, embellished, and deviant, must be introduced, which defines which material should be used as a starting point for creating categories (Mayring, 2010, p. 84) This also applies to the level of abstraction to be achieved. After the selection criterion has been determined, the material is worked through and as soon as the selection criterion is found for the first time in the text, the category formulation is as close as possible to the formulation found and taking into account the desired level of abstraction. If the criterion is met the next time, it must be decided whether this represents a new category (new formation) or can be subsumed under an existing category (Mayring, 2010, p. 85).

After about 10-50% of the available material has been processed, the categories are revised (Figure 4.10), whereby an evaluation (formative reliability test) is carried out to determine whether the categories, selection criteria and level of abstraction meet the desired analysis goal (Mayring, 2000, p. 3; Mayring, 2010, p. 85). In the further course of the process, individual categories of a main category can be bundled (Figure 4.10) and evaluated (Mayring, 2000, p. 3). The individual work steps and rules ("I-Rules") that must be observed and complied with when using the "Inductive category formation" analysis form are shown in Table 4.11 (Mayring, 2014, p. 82). For the investigation, there is "[...] a system of categories on a specific topic [or on the research question], combined with specific text passages "(Mayring, 2010, p. 85) from the transcribed problem-centered interviews, which can be interpreted in the sense of the research question.

In a feedback loop the categories are revised, after which they are reduced to the main categories and checked in relation to their rehabilitation. For more details, the steps of this analysis will be illustrated in the figure below:
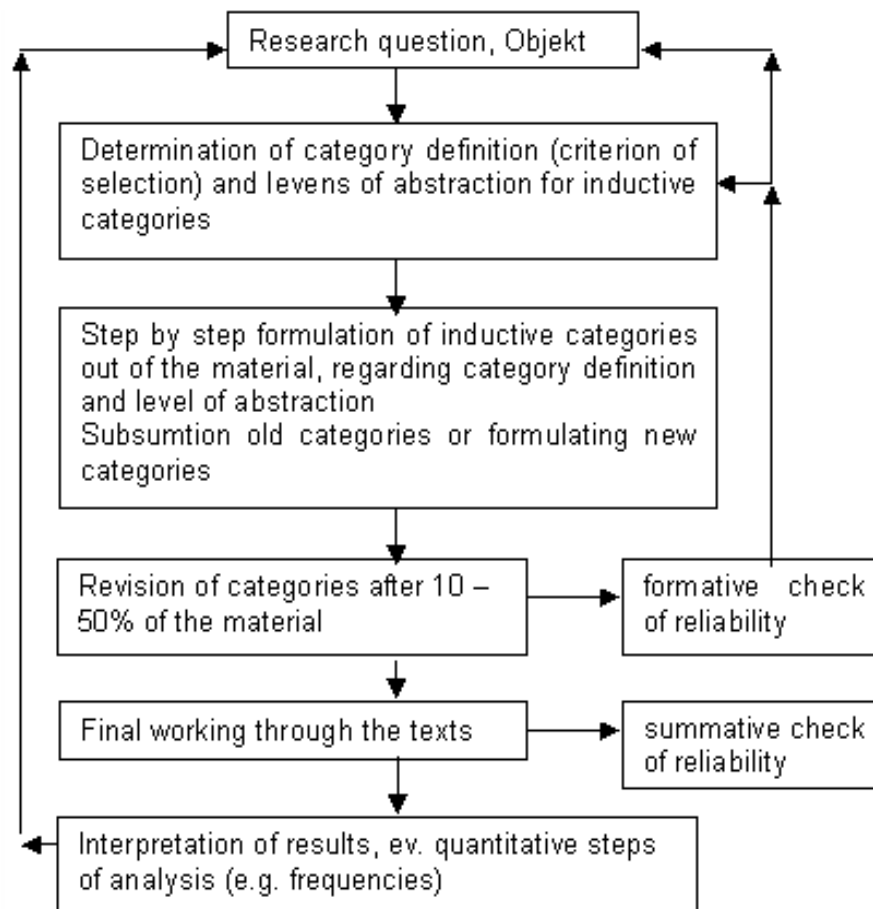
Figure 4.10 Step Model of Inductive Category Development

Source: Phillip Mayring, 2000, p. 3; Mayring, 2010, p. 84

Table 4.11 Rules for The Single Steps of Inductive Category Formation

I-Rule	Description
I1: Research Question	I1.1: Formulate a clear research question (not only a topic)! I1.2: Describe the theoretical background (theoretical position, previous studies)! I1.3: The research question must fit an inductive logic, that means it must be explorative or descriptive in its nature.
I2: Category definition and level of abstraction	I2.1: The Category definition serves as selection criterion to determine the relevant material from the texts; it must

	be an explicit definition; theoretical references can be useful.
	I2.2: The level of abstraction defines, how specific or general the categories must be formulated. Both rules (category definition and level of abstraction) are central for inductive category formation. They must be defined in advance and can be altered within the pilot phase.
I3: Coding the text	I3.1 Read the material from the beginning, line by line, and check if material occurs that is relatedto the category definition! All other material is ignored within this procedure.
	I3.2 Formulate a category near to the text at the level of abstraction!
	I3.3 If the next passage fits the category definition, check if it can be subsumed to the first categoryor if a new category must be formulated, and so on!
I4: Revision	I4.1 A revision in the sense of a pilot loop is necessary when the category system seems to becomestable (only few new categories).
	I4.2 Check if the category system fits the research question! If not, a revision of the categorydefinition would be necessary.
	I4.3 Check if the degree of generalization is sufficient! If you have formulated only few categories,maybe the level of abstraction is too general. If you have formulated a huge number of categories maybe the level of abstraction is too specific.
	I4.4 If you have changed the category definition and/or the level of abstraction, you must start the analysis from the beginning of the material!
I5: Final coding	I5.1 The whole material must be worked through with the same rules (category definition and level of abstraction).

I6: Main categories	I6.1 At the end of this process you have a list of categories. You can group them and build maincategories, if useful for answering the research question.
	I6.2 Follow the rules of summarizing qualitative content analysis (see book chapter 6.2) for thisstep!
I7:Intra-/intercoder check	I7.1 Start coding from the beginning of the material and compare the results (intra-coder agreement) (see book chapter 7 for this step)!
	I7.2 Give the material (or parts of it) to a second coder and compare the results. If the explorativecharacter of the study is predominant, give him or her only the text. If the frequencydistribution of the categories should be tested, give him or her your categories as well.
	I7.3 You should discuss the results and decide which coding is adequate (following the rules). Onlyif the second coding is held as better coding, this is counted as disagreement.
	I7.4 If you change the better coding for analysis, you can enhance reliability (not always possible).
I8: Results	I8.1 The result (of course after checking quality criteria like inter-coder agreement) is at first thelist of categories and maybe main categories.
	I8.2 If categories had been found in respect to several text passages (many subsumptions) a frequency analysis of the category occurrences could be useful.
	I8.3 The category system and eventually the frequencies must be interpreted in the direction of the research question.

Source: Mayring, 2014, p. 82

The inductive category formation characterizes a possible technique of qualitative content analysis. The categories are formed directly from the recorded interview data, as it "[...] derives the categories directly from the material in a generalization process [...] without referring to previously formulated theoretical concepts [...]" (Mayring, 2010, p. 83). For this study in the context of inductive

category formation, "what kind of skills deficit and its factors influence, owned by prospective mechanical engineering teachers related to the school needs for competent teachers in West Java?" Was formulated as a research-leading question. The next step is to introduce a selection criterion (definition of categories) that excludes the inessential and embellishments (Mayring, 2010, p. 84). This category definition (Figure 4.10) determines which material should be used as a starting point for creating categories (Mayring, 2010, p. 84). In the specific case, the term "skills deficit" was understood to mean all aspects that could have a comprehensible, subjective, positive or negative impact on the future career as vocational teacher. All interview passages that meet this definition must then be identified and marked as a category by the coder (Figure 4.9).

At the same time, a general level of abstraction for the category must be determined. In this study, these were as clear and concrete formulations as possible on factors influencing skills deficit of vocational teacher, which can also occur in other individuals (Figure 4.10). The analysis runs selectively through the material, looking only at kind of skills deficit and influencing factors, and uses a middle level of abstraction to form categories. After the selection criterion has been determined, the material is worked through and as soon as the selection criterion is found in the text for the first time, the category formulation is as close as possible to the formulation found and taking into account the desired level of abstraction (Table 4.9). If the criterion is met the next time, a decision has to be made as to whether it represents a new category (creation of a new category, Figure 4.10) or whether it can be subsumed under an already existing category (Mayring, 2010, p. 85). The 1st level of abstraction for inductive category formation was characterized in the context of the present work by the definition: "As close as possible to the text-oriented formulations on kind of skills deficit and influencing factors of skills deficit, which can also occur in other people." (Table 4.12). For the actual material passage, this means that the coder selectively, only looking at influencing factors, analyzes the interview material and can immediately form the categories on a medium level of abstraction.

Table 4.12 Determinations Within the Inductive Category Formation

Category Definition	Kind of skills deficit and it's Influencing factors are understood to mean all aspects that can have a comprehensible, subjective, positive or negative effect on the future career as vocational teacher.
1. Level of abstraction	Formulations as close as possible to the text on kind of skills deficit and it's factors influencing that may also occur with other prospective teachers.
2. Level of abstraction	As specific as possible naming kind of skills deficit and it's factors influencing from prospective vocational teachers.

Next, the analysis units to be used, which are used in the context of inductive category formation, are defined. Table 4.13 shows the coding unit, context unit and evaluation unit used in the present study. After all the content analysis framework conditions have been determined, the actual material flow and coding process begins (Figure 4.9). After about a half of the material (five interviews) had been worked through with the creation of new categories or subsumption of the text passages found under categories that had already been created, the categories were revised. Since it was already foreseeable that the number of categories was too high or too small to derive manageable results to answer the research question, the level of abstraction was further increased.

Table 4.13 Units of Analysis Within Inductive Category Formation

Coding unit	Content-bearing phrase
Context unit	Individual case / person
Evaluation unit	All documents (or all of the material)

Then the developed category system was interpreted in the sense of the question, quantitative analyses were carried out and the individual categories were bundled into main categories according to theoretical considerations (sub chapter 5.1.2).

5. Empirical findings

5.1 Interpretation of Data

5.1.1 Sample Description

Purposive sampling being a non-probability method of sampling seemed to be the best way to choose the research participants, since the sample is chosen strategically. (Bryman and Bell, 2015, p. 442). Theoretical sampling, a form of purposive sampling, has been applied to get a sample of lecturer that have been lecturing in TVET faculty at Mechanical Engineering study program and teacher at secondary vocational school who have been become a supervisor teacher in teaching internship program.

This sampling method requires pre-defined criteria, namely specific characteristics the participants need to possess to be included in the sample. Therefore, the research participants were lecturer who involved in teaching activity in TVET faculty and teacher who involved as supervisor teacher in teaching internship program for prospective teachers from university. They have different specialization backgrounds. The aim was to interview: (1) lecturer at mechanical engineering study program in automotive, production and construction technology and refrigeration and air conditioning concentration, to gain information about practical activity in TVET faculty; (2) teacher at secondary vocational schools which is been place for teaching internship program. These two kinds of target group selected based on fact that they are knowing better than anybody about the prospective teachers' capability and competency while they are being a student at university.

The sample included a total of 20 peoples (n = 20) aged 40 up to 56 years. 10 peoples are supervisor teacher at secondary vocational schools for sub-research question1 , and 10 peoples are lecturer at TVET Faculty of UPI Bandung for sub-research question 2. To increase the interviewer's competence and to evaluate the guidelines, the interview situations were simulated in advance and then analysed, with two interviews being carried out as trial interviews that were not included in the evaluation. Within the entire sample for sub-research question 2 (n = 10), most of the interviewee questioned were between 40-45 years old (four interviewee),

three interviewees between 45-50 years old, two interviewees between 50-55 years old, and one interviewee is more than 55 years old. While the condition of sample for sub-research question 1 (n = 10), most of the interviewee questioned were between 40-45 years old (five interviewee), four interviewee is more than 55 years old, and one interviewee between 50-55 years old (see Table 5.1).

Table 5.1 Interviewee List

NO	CODE	POSITION	ROLE IN INTERNSHIP PROGRAM	AGE	SPECIALIZATION	INSTTUTION
1	UL 1	Lecturer	Internship supervisor	40-45	AUTOMOTIVE	UPI
2	UL 2	Lecturer	Internship supervisor	>55	CNC	UPI
3	UL 3	Lecturer	Internship supervisor	40-45	REFRIGERATION	UPI
4	UL 4	Lecturer	Internship supervisor	40-45	WELDING	UPI
5	UL 5	Lecturer	Internship supervisor	50-55	AUTOMOTIVE	UPI
6	UL 6	Lecturer	Internship supervisor	50-55	MACHINING	UPI
7	UL 7	Lecturer	Internship supervisor	45-50	WELDING	UPI
8	UL 8	Lecturer	Internship supervisor	45-50	HYDROLIC AND PNEUMATIC	UPI
9	UL 9	Lecturer	Internship supervisor	45-50	REFRIGERATION	UPI
10	UL 10	Lecturer	Internship supervisor	40-45	MACHINING	UPI
11	TVS 1	Teacher	Supervisor teacher	40-45	REFRIGERATION	SMK 1 CIMAHI
12	TVS 1	Teacher	Supervisor teacher	40-45	REFRIGERATION	SMK 1 CIMAHI
13	TVS 1	Teacher	Supervisor teacher	40-45	REFRIGERATION	SMK 1 CIMAHI
14	TVS 1	Teacher	Supervisor teacher	40-45	AUTOMOTIVE	SMK 6 BANDUNG
15	TVS 1	Teacher	Supervisor teacher	50-55	AUTOMOTIVE	SMK 6 BANDUNG
16	TVS 1	Teacher	Supervisor teacher	>55	AUTOMOTIVE	SMK 6 BANDUNG
17	TVS 1	Teacher	Supervisor teacher	40-45	WELDING	SMK 2 BANDUNG
18	TVS 1	Teacher	Supervisor teacher	>55	WELDING	SMK 2 BANDUNG
19	TVS 1	Teacher	Supervisor teacher	>55	MACHINING	SMK 12 BANDUNG
20	TVS 1	Teacher	Supervisor teacher	>55	MACHINING	SMK 12 BANDUNG

5.1.2 Results of Inductive Category Formation

In this study, inductive category development was carried out on 2 sub-research questions, below will explain the implementation steps of data analysis through inductive category development.

5.1.2.1 Activity of Teaching Internship of Prospective Teachers at Secondary Vocational Schools (SMK's)

The first sub-research question seeks to find out, how the activity of teaching internship at secondary vocational schools conducted to investigate what kind of skills deficit held by prospective teachers. To do so the activity of teaching internship program at secondary vocational schools have been analysed. To get a better understanding of the problem at hand, the following categories with respective code have been set out and carefully investigated. A total of 10 interviews with supervisor teachers who supervise the prospective teachers in teaching internship program were evaluated for the inductive creation of categories. Figure below shows the respective supervisor teachers as interviewee, specialization, the age, and the role in teaching internship programme. As already described, the inductive creation of categories (coding) directly from the interview transcripts then took place under the previously defined content analysis principles.

Table 5.2 Interviewee at Secondary Vocational Schools

NO.	CODE	POSITION	ROLE IN INTERNSHIP PROGRAM	AGE	SPECIALIZATION	INSTITUTION
1.	TVS 1	Teacher	Supervisor teacher	40-45	Refrigeration	SMK 1 CIMAHI
2.	TVS 1	Teacher	Supervisor teacher	40-45	Refrigeration	SMK 1 CIMAHI
3.	TVS 1	Teacher	Supervisor teacher	40-45	Refrigeration	SMK 1 CIMAHI
4.	TVS 1	Teacher	Supervisor teacher	40-45	Fabrication	SMK 12 BANDUNG
5.	TVS 1	Teacher	Supervisor teacher	50-55	Fabrication	SMK 12 BANDUNG
6.	TVS 1	Teacher	Supervisor teacher	>55	Fabrication	SMK 12 BANDUNG
7.	TVS 1	Teacher	Supervisor teacher	40-45	Welding	SMK 2 BANDUNG

8.	TVS 1	Teacher	Supervisor teacher	>55	Welding	SMK 2 BANDUNG
9.	TVS 1	Teacher	Supervisor teacher	>55	Machining	SMK 12 BANDUNG
10.	TVS 1	Teacher	Supervisor teacher	>55	Machining	SMK 12 BANDUNG

After the new coding using the second level of abstraction, the categories (Z-rules, Table 4.10) are also paraphrased and generalized based on the analysis form of the summarizing content analysis. The coded statements (categories) are reduced to their content-bearing components and paraphrased (Figure 4.3) to simplify subsequent processing. Then all coded statements are generalized to a defined level of abstraction (Mayring, 2010, p. 67).

| Material | Category | Sub-category | Main Category |

Material: in my subjects, these intern students must teach in theory classes as well as teach in workshops for practical learning sir, so they are required to teach both theory and practice

Category: intern students must teach in theory classes as well as teach in workshops for practical learning

Material: The standard made for curriculum development is based on the quality of the graduates expected, we called graduate competency standards and it was made during curriculum development Sir.

Category: curriculum development is based on the quality of the graduates expected, we called graduate competency standards

Material: in my subjects, they are required to teach in theory and practice because my subjects are productive subjects, sir, so they must have a skill that supports their teaching assignment in our school

Category: they are required to teach in theory and practice because my subjects are productive subjects, sir, so they must have a skill that supports their teaching assignment

Material: they have handled students directly, the intern directly to the front of the class to carry out learning to students and the supervisor observes the learning process carried out.

Category: the intern directly to the front of the class to carry out learning to students and the supervisor observes the learning process carried out.

Material: for my subjects, they must compile a minimum of 8 lesson plans, sir, both theory classroom and practical activity in the workshop, and must follow the lesson plans in our school

Category: they must compile a minimum of 8 lesson plans, sir, both theory classroom and practical activity in the workshop, and must follow the lesson plan

Material: in my subject, usually, I will take my intern to my class to observe my teaching activity in theory and practice, this observation session was important for them to analyze the student's characteristic and teaching style, after observation in my class we will discuss how many meetings they must attend as university regulation

Category: I will take my intern to my class to observe my teaching activity in theory and practice, this observation session was important for them to analyze the student's characteristic and teaching style, after that we will discuss how many meetings they must attend

paraphrasing and generalization as well as first and second reduction

Sub-category: Teaching plan for intern students in school

Sub-category: Teaching preparation for intern students in the beginning of the program

Main Category: Teaching Assignment

Figure 5.1 Excerpt from The Category System

(main category teaching assignment)

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Table 5.3 Inductive Category Development-Main Category: Teaching Assignment (Example from Interview)

Interview transcript TVS - 01 (Refrigeration)	
Material	'[…]well, sir, usually intern students from universities in our school will be assigned to C2 (productive/technical subjects). then next step will be given a schedule for mandatory face-to-face hours as much as 6 times in each subject assigned to the intern students, usually tailored to the needs in their respective study program, but in general, they are required to enter the class a total of 6 meetings or adjusted to guide from the university. […]".
Category	intern students from universities in our school will be assigned to C2 (productive/technical subjects). then next step will be given a schedule for mandatory face-to-face hours as much as 6 times in each subject assigned to the intern students, usually tailored to the needs in their respective study program
Paraphrase (incl. 1st reduction)	the intern students must teach students several meetings according to the demands of the program, they teach theory in class and practice in the workshop.
Generalization (incl. 2nd reduction)	as plan in the program, intern students must fulfil all meeting plan in theory and practical activity
Subcategory	teaching plan for intern students in school
Interview transcript TVS – 10 (Machining)	
Material	'[…]in my subject, usually, I will take my intern to my class to observe my teaching activity in theory and practical, this observation session was important for them to analyse the student's characteristic and teaching style, after observation in my class we will discuss how many meetings they must attend as university regulation […]".
Category	I will take my intern to my class to observe my teaching activity in theory and practical, this observation session was important for them to analyse the student's characteristic and teaching style, after observation in my class we will discuss how many meetings they must attend as university regulation

Paraphrase (incl. 1st reduction)	the teaching activity will be start with regular teachers come into classroom for give lessons as usual, then the intern students come to observe in the initial meeting, after that there is discussion between regular teachers and intern students to be arranged in such a way for future
Generalization (incl. 2nd reduction)	Intern students will have an initial meeting to observe the regular teacher in the classroom. This activity was good for intern students to gain more motivation for having self-confidence in the classroom activity
Subcategory	Teaching preparation for intern students in the beginning of the program

In the next step (1st reduction, Figure 4.8) all statements that are irrelevant or have the same meaning for the investigation are deleted. As a result of this reduction, the source material shrinks to the relevant core information (Figure 4.3). In the present case, due to the large amount of data, on the one hand paraphrasing and generalization took place in one step and on the other hand a further summary by a second reduction in the form of an increase in the level of abstraction and a combination of related statements (Mayring, 2010, p. 67). At the same time, all statements that cannot be abstracted to the defined level are directly excluded. As already described, the first level of abstraction was set very low to capture the transcribed source material as precisely as possible. First, all statements about activity of teaching internship program at secondary vocational schools should be summarized in such a way that on the one hand case-specific information (including teaching assignment, internship preparation, lesson plan development, teaching role, teaching ability, internship assessment and program evaluation) on the other hand, statements that are as general as possible are created that are bundled of the extracted differentiations within the category.

Within the second reduction loop (2nd reduction, Table 4.10), related statements are further summarized, and further duplications are excluded. Finally, the categories were grouped into main categories (Mayring, 2010, p. 98). Figure 5.1 visualizes, using the example of the main category "teaching assignment", the assignment of individual categories determined to sub and main categories in the

process of inductive category development. In Figure 5.1, the process steps paraphrasing and generalization as well as first and second reduction (Table 4.10), which lie between the individual inductive category and the derived sub-category, are not shown. In the figures 5.1 the procedure is shown as an example for the main categories "teaching assignment". The procedure was applied analogously to the generation of the other sub and main categories. After coding all 10 interviews, the category system consisted of 160 individual categories inductively based on the interview materials.

These were then reduced to 40 categories through the steps of paraphrasing (including 1st reduction) and generalization (including 2nd reduction) as well as in the process of the formative reliability test and by raising the level of abstraction used (Mayring 2015). A total of 15 sub-categories were then formed, which then became seven main categories (teaching assignment, internship preparation, lesson plan development, teaching role, teaching ability, internship assessment and program evaluation). Table 5.4 and Figure 5.2 shows the nominal distribution of the individual sub and main categories across all 10 evaluated interviews, which (main and sub) categories could be identified in how many interviews, with multiple responses within of an interview were not counted.

From the data analysed, the main category of 'teaching ability' is a topic that has received a lot of responses, namely 95 interview materials discussing this matter, besides that the main category 'lesson plan development' is also one of the topics of discussion about activities carried out at schools. From the 10 interviews conducted, 160 materials were obtained at this analysis stage, of which there were 15 sub-categories and 7 main-categories, (figure 5.2). Main categories of teaching ability are obtained from 95 materials, divided into 9 materials for the sub-category theory teaching ability, 28 for the sub-category practical ability, 13 for the sub-category practical ability limitations, 21 for the sub-category expected competency form intern students, 11 for the sub-category problem solving ability, 8 the sub-category interns students advantage skills, and 5 for the sub-category intern student's deficiency. The main lesson plan development consists of 17 interview materials with details of 4 for the sub-category preparation of lesson plan development by intern students before teaching, 13 for lesson plan development

process. The main category of teaching assignment consists of 13 materials with 2 sub-categories, namely: 10 teaching plans for intern students in school's sub-category, 3 teaching preparation for intern students in the beginning of the program. The main category teaching role consists of 1 subcategory, namely: the sub-category intern student's role in practical teaching.

Table 5.4 Nominal Distribution Within the Inductive Category Development

No	Interviewee code	Main Category															Total
		TA		IP	LPD		TR	TA							IA	PE	
		Sc1	Sc2	Sc3	Sc4	Sc5	Sc6	Sc7	Sc8	Sc9	Sc10	Sc11	Sc12	Sc13	Sc14	Sc15	
1.	TVS 01	2		1	1	1	1	1	3	2	3	1		1	1	1	19
2.	TVS 02	1		1	1	1	2	1	4	1	3	1	1	1	1	1	20
3.	TVS 03	1		1	1	1	1	1	3	1	2	1	1	1	1	1	17
4.	TVS 04	1		1	1	1	1	1	3	1	2	1	1	1	1	1	17
5.	TVS 05	1				1	1	1	3	2	2	1	1		1		14
6.	TVS 06	1		1		2	1	1	2	1	2	1	1		1	1	15
7.	TVS 07	1	1			1	1		3	2	2	1	1		1		14
8.	TVS 08	1	1	1		2	1	1	3	1	2	2	1	1	1	1	19
9.	TVS 09	1				1	1	1	2	1	2	1	1		1	1	13
10	TVS 10		1			2	1	1	2	1	1	1			1	1	12
	Total	10	3	6	4	13	11	9	28	13	21	11	8	5	10	8	160

Note :

- TA = Teaching Assignment
  - Sc1 = teaching plan for intern students in school
  - Sc2 = teaching preparation for intern students in the beginning of the program
- IP = Internship Preparation
  - Sc3 = starting the internship program activity between schools and university
- LPD = lesson plan development
  - Sc4 = preparation of lesson plan development by intern students before teaching
  - Sc5 = lesson plan development process
- TR = teaching role
  - Sc6 = intern students' role in practical teaching
- TA = Teaching ability
  - Sc7 = theory teaching ability
  - Sc8 = practical teaching ability
  - Sc9 = practical teaching ability limitations
  - Sc10 = expected competency from intern students
  - Sc11 = problem solving ability
  - Sc12 = intern students advantage skills

- Sc13 = intern students' deficiency
- IA = Teaching internship
  - Sc14 = students teaching exam
- PE = program evaluation
  - Sc15 = internship program evaluation related to future improvement
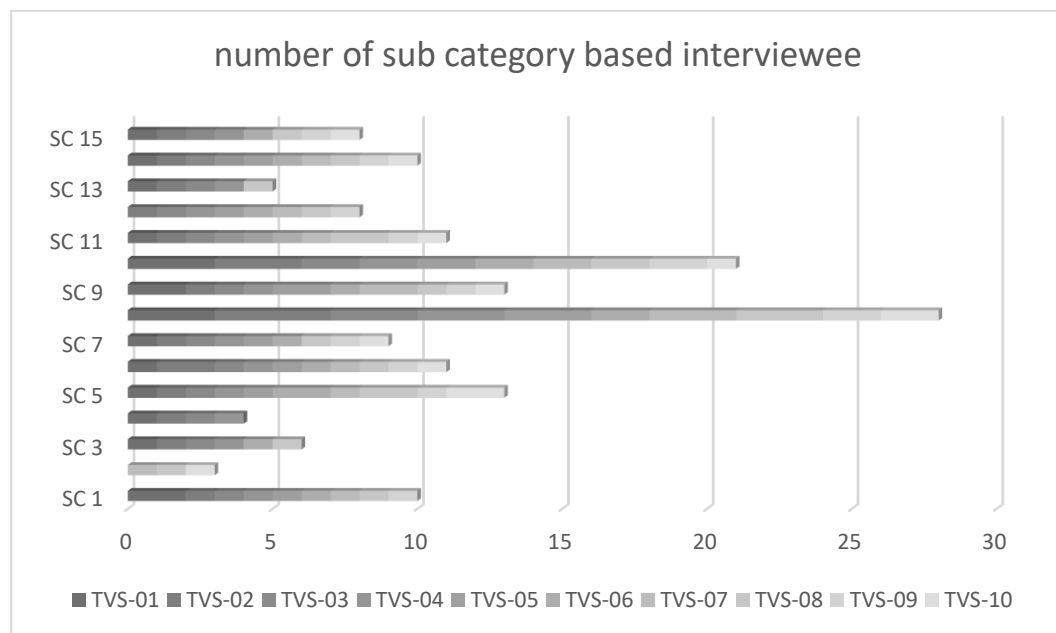
Figure 5.2 Nominal Distribution Within the Inductive Category Development
(Teaching Internship Program at SMK)

5.1.2.2 Activity of Practical Learning Process at TVET Faculty

The second sub-research question seeks to find out, how the learning process conducted at TVET faculty at Universitas Pendidikan Indonesia (UPI), especially in practical learning process part. To do so the activity of practical learning process at TVET faculty have been analysed. To get a better understanding of the problem at hand, the following categories with respective code have been set out and carefully investigated. A total of 10 interviews with lecturer who teaching in TVET faculty in practical subject were evaluated for the inductive creation of categories. Figure below shows the respective lecturer as interviewee, the year of experience, specialization, the age, and the role in teaching internship programme. As already described the inductive creation of categories (coding) directly from the

interview transcripts then took place under the previously defined content analysis principles.

Table 5.5 Interviewee at TVET Faculty List

NO.	CODE	POSITION	ROLE IN INTERNSHIP PROGRAM	AGE	SPECIALIZATION	INSTITUTION
1	UL 1	Lecturer	Internship supervisor	40-45	Automotive	UPI
2	UL 2	Lecturer	Internship supervisor	>55	CNC	UPI
3	UL 3	Lecturer	Internship supervisor	40-45	Refrigeration	UPI
4	UL 4	Lecturer	Internship supervisor	40-45	Welding	UPI
5	UL 5	Lecturer	Internship supervisor	50-55	Automotive	UPI
6	UL 6	Lecturer	Internship supervisor	50-55	Machining	UPI
7	UL 7	Lecturer	Internship supervisor	45-50	Welding	UPI
8	UL 8	Lecturer	Internship supervisor	45-50	Hydraulic and pneumatic	UPI
9	UL 9	Lecturer	Internship supervisor	45-50	Refrigeration	UPI
10	UL 10	Lecturer	Internship supervisor	40-45	Machining	UPI

After the new coding using the second level of abstraction, the categories (Z-rules, Table 4.10) are also paraphrased and generalized based on the analysis form of the summarizing content analysis. The coded statements (categories) are reduced to their content-bearing components and paraphrased (Figure 4.3) to simplify subsequent processing. Then all coded statements are generalized to a defined level of abstraction (Mayring, 2010, p.67).

Material	Category		Sub-category	Main Category

regarding curriculum development in the department of mechanical engineering education based on schedule at university is every 5 years, but this year we also undergo curriculum development even if it has not been 5 years but whose nature is incidental

curriculum development has been set up every 5 years, but yearly all lecturers conducting evaluation for make sure the curriculum is still suitable with industry

The standard made for curriculum development is based on the quality of the graduates expected, we called graduate competency standards and it was made during curriculum development Sir.

curriculum development is based on the quality of the graduates expected, we called graduate competency standards

all lecturers are involved, long before there is a department of automotive engineering, we still have a group of areas of expertise or automotive specialization, every lecturer that is all discussion about this curriculum, so all lecturers are involved.

every lecturer that is all discussion about this curriculum, so all lecturers are involved.

every year we conduct the curriculum evaluation for adjusting to a new standard or industry development, from evaluation we will decide that we need develop new approach or still using current curriculum.

every year we conduct the curriculum evaluation for adjusting to a new standard or industry development.

Mostly we usually refer to the international association sir, then also in national level, we have SKKNI that is a reference to the development of the refrigeration engineering curriculum particularly in our department sir.

we usually refer to the international association sir, then also in national level, we have SKKNI that is a reference to the development of the refrigeration engineering curriculum

for the pneumatic hydraulic it was me who took responsibility for curriculum development, usually we will be connecting the curriculum with National Occupation Standard (SKKNI) and the development of industry and researched through the internet its materials.

usually, we will be connecting the curriculum with National Occupation Standard (SKKNI) and the development of industry

paraphrasing and generalization as well as first and second reduction

curriculum development schedule

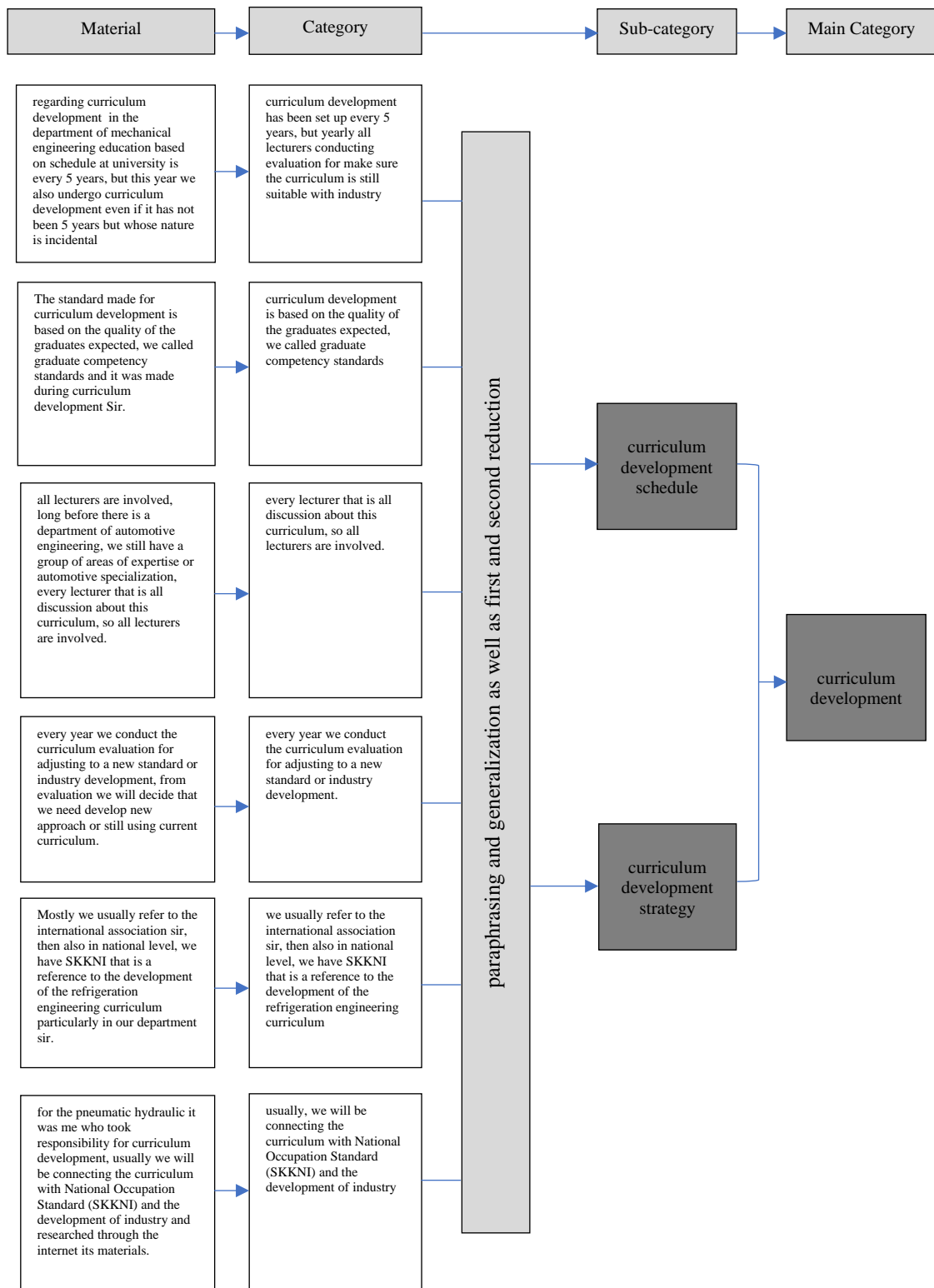curriculum development strategy

curriculum development

Figure 5.3 Excerpt from The Category System

(Main Category Curriculum Development)

Table 5.6 Inductive Category Development-Main category: Curriculum
Development
(Example from Interview)

Interview transcript UL 5 – Lecturer (Automotive)	
Material	'[…] regularly the curriculum development in UPI set up once in 5 years, but in implementation we also made a change yearly when we feel that the curriculum must adjust to industry development or new standard in area of expertise […]".
Category	curriculum development set up once in 5 years, but in implementation we also made a change yearly when we feel that the curriculum must adjust to industry development
Paraphrase (incl. 1st reduction)	curriculum development has been set up every 5 years, but yearly all lecturers conducting evaluation for make sure the curriculum is still suitable with industry
Generalization (incl. 2nd reduction)	The university has a curriculum development schedule in relation to industrial developments
Subcategory	Curriculum development schedule
Interview transcript UL 2 – Lecturer (CNC)	
Material	'[…]so, first in the drafting of the curriculum we refer to competence that the vocational schools (SMK) students should master, so as an example in mechanical engineering program it is split into 6 major, there's machinery, welding, fabrication, casting techniques, aircraft technique, and engineering drawing. The curriculum we form in my faculty refers to the study program at SMK, among which we take weight in the later existence of students who choose machinery, casting, or welding techniques, as well as engineering drawing […]".
Category	in the drafting of the curriculum, we refer to competence that the vocational schools (SMK) students should master, so as an example in mechanical engineering program it is split into 6 major, there's machinery, welding, fabrication, casting techniques, aircraft technique, and engineering drawing

Paraphrase (incl. 1st reduction)	curriculum development will refer to National Occupation standard which is a basis for vocational schools (SMK) curriculum, for some area it refers to international standard
Generalization (incl. 2nd reduction)	curriculum development reference and appropriate stakeholder input are very important to connecting the classroom process with industrial world
Subcategory	Curriculum development strategy

Table 5.7 Inductive Category Development-Main Category : Learning Strategy
(Example from Interview)

Interview transcript UL 6 – Lecturer (Machining)	
Material	'[…] regarding the learning process in our department, we are here according to the curriculum, which is 60% theory and 40% practice. Students will learn theory in beginning of semester than they will practice after that. […]".
Category	regarding the learning process in our department, we are here according to the curriculum, which is 60% theory and 40% practice.
Paraphrase (incl. 1st reduction)	Theory hour is higher than practical learning hour in the learning process
Generalization (incl. 2nd reduction)	learning hours comparison between theory and practice in VET faculty
Subcategory	Learning condition
Interview transcript UL 8 – Lecturer (Hydraulic and Pneumatic)	
Material	'[…]The concept of our learning based on the existing curriculum is CBT, we blend with experimental study, but the theory remains at the beginning of the next meeting, it's already been given in the form of job sheet they had to complete at the end of that lecture, overall, 16 times the meeting […]".
Category	The concept of our learning based on the existing curriculum is CBT, we blend with experimental study, but the theory remains at the beginning

Paraphrase (incl. 1st reduction)	practical learning concepts used in faculty was varies depend on the subject, commonly several subject used competency-based training (CBT)
Generalization (incl. 2nd reduction)	Learning concepts used in VET faculty
Subcategory	Learning concept

In the next step (1st reduction, Table 4.10) all statements that are irrelevant or have the same meaning for the investigation are deleted. As a result of this reduction, the source material shrinks to the relevant core information (Figure 4.3). In the present case, due to the large amount of data, on the one hand paraphrasing and generalization took place in one step and on the other hand a further summary by a second reduction in the form of an increase in the level of abstraction and a combination of related statements (Mayring, 2010, p. 67). At the same time, all statements that cannot be abstracted to the defined level are directly excluded. As already described, the first level of abstraction was set very low to capture the transcribed source material as precisely as possible. First, all statements about activity of practical learning process at TVET faculty should be summarized in such a way that on the one hand case-specific information (including curriculum development, learning strategy, practical learning process, teaching internship) on the other hand, statements that are as general as possible are created that are bundled of the extracted differentiations within the category. Within the second reduction loop (2nd reduction, Table 4.10), related statements are further summarized, and further duplications are excluded.

Finally, the categories were grouped into main categories (Mayring, 2010, p. 98). Figure 5.3 visualizes, using the example of the main category "curriculum development", the assignment of individual categories determined to sub and main categories in the process of inductive category development. In Figure 5.3, the process steps paraphrasing and generalization as well as first and second reduction (Table 4.10), which lie between the individual inductive category and the derived sub-category, are not shown. In the figures 5.1 the procedure is shown as an

example for the main categories "Curriculum Development", and "Learning strategy". The procedure was applied analogously to the generation of the other sub and main categories. After coding all 10 interviews, the category system consisted of 160 individual categories inductively based on the interview materials. These were then reduced to 20 categories through the steps of paraphrasing (including 1st reduction) and generalization (including 2nd reduction) as well as in the process of the formative reliability test and by raising the level of abstraction used (Mayring 2015). A total of 15 sub-categories were then formed, which then became five main categories (curriculum development, learning strategy, Learning preparation, practical learning process, and teaching internship). Table 5.8 and Figure 5.6 shows the nominal distribution of the individual sub and main categories across all 10 evaluated interviews, which (main and sub) categories could be identified in how many interviews, with multiple responses within of an interview were not counted.

From the data analysed, the main category of 'practical learning process' is a topic that has received a lot of responses, namely 74 interview materials discussing this matter, besides that the main category 'curriculum development' is also one of the topics of discussion about activities carried out at TVET faculty. From the 10 interviews conducted, 166 materials were obtained at this analysis stage, of which there were 15 sub-categories and 5 main-categories, (figure 5.2). Main categories of curriculum development are obtained from 20 materials, divided into 9 materials for the sub-category curriculum development schedule and 11 for the sub-category curriculum development strategy. The main category learning strategy consists of 19 interview materials with details of 6 for the sub-category learning situation, 6 for learning concepts and 7 for learning targets. The main category of learning preparation consists of 26 materials with 3 sub-categories, namely: 8 practical learning preparation sub-category, 6 practical learning preparation sub-category and 12 learning plan sub-category. and for the main category teaching internship consists of 2 subcategories, namely: the sub-category teaching internship requirements of 17 interviews, and the sub-category of teaching internship purposes as many as 10 interviews.

Table 5.8 Nominal Distribution Within the Inductive Category Development

No	Interviewee code	Main Category														Total
		CD		LS			LP			PLP					TI		
		Sc 1	Sc 2	Sc 3	Sc 4	Sc 5	Sc 6	Sc 7	Sc 8	Sc 9	Sc 10	Sc 11	Sc 12	Sc 13	Sc 14	Sc 15	
1.	UL 1	1	1	1	1	2			3	1	1	1	1	1	2	2	18
2.	UL 2		2						2	4	1	1	2	1	1	1	15
3.	UL 3	3	2				1		1	1	1	1	2	3	2		17
4.	UL 4		1	1	1	1	2		2	2	1	1	1	2	2	1	18
5.	UL 5	1	1	1	1	1		1	2	1	1	1	1	5	1	1	19
6.	UL 6	1	1	1			1	1		1	1	1	1	1	3	1	14
7.	UL 7		1		1		1	1		2	1	1	1	2	2	1	14
8.	UL 8	1	1		1	1	1	1		1	8	2	1	2	2	1	23
9.	UL 9	1	1	1		1	1	1	1	1	1	1	1	1	1	1	14
10	UL 10	1		1	1	1	1	1	1	1	1	1	1	1	1	1	14
	Total	9	11	6	6	7	8	6	12	15	17	11	12	19	17	10	166

Note :

- CD = Curriculum development
  - Sc1 = Curriculum development schedule
  - Sc2 = Curriculum development strategy
- LS = Learning strategy
  - Sc3 = learning situation
  - Sc4 = Learning concept
  - Sc5 = Learning target
- LP = Learning preparation
  - Sc6 = Practical learning preparation
  - Sc7 = Practical learning schedule
  - Sc8 = Learning plan
- PLP = Practical learning process
  - Sc9 = Industrial cooperation
  - Sc10 = practical assignment
  - Sc11 = practical learning activity
  - Sc12 = practical learning evaluation
  - Sc13 = practical learning challenges
- TI = Teaching internship
  - Sc14 = Teaching internship requirement
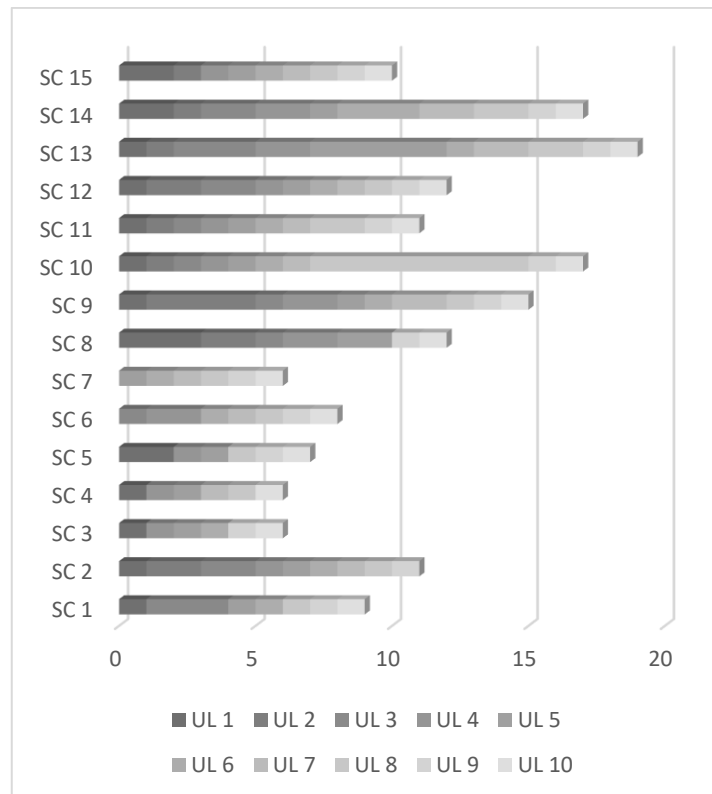 - Sc15 = Teaching internship purposes

Figure 5.4 Nominal Distribution Within the Inductive Category Development

5.2 Evaluation of Interview Results

The implementation of the interviews that have been carried out will be presented in this sub-chapter. Submission of the results of the interviews that have been carried out will be presented based on the main categories resulting from the inductive category developments process that has been carried out (sub-chapter 5.1.2). Submission of interview results based on the main categories is intended to provide an overview to the reader about the findings obtained from extracting information from respondents.

5.2.1 Activity of Teaching Internship of Prospective Teachers at Secondary Vocational Schools (SMK's)

5.2.1.1 Main Category Internship Preparation

The teaching internship program for students from TVET faculty at secondary vocational high school (SMK) begins with proposals from the university to SMK and SMK management will accept being assigned to become an intern teacher in the study program according to their respective backgrounds.

> *„[…]Usually, the University (UPI) will send a letter requesting an internship (UPI) to discuss the details of the activity starting from the apprenticeship planning to the expected results.(**) After that, the school will appoint the supervisor teacher for intern students, then determined the time of the internship according to the schedule in the school[…]".*
> *„[…]After that the University (UPI) will send its students accompanied by a supervisor and meet with the supervising teacher in the school […]" (TVS-08).*

> *„[…]from the study program management usually just accept the intern from school, so a few days before the student starts the activity, there is information that there are apprenticed students. It will be divided on any subject the student is placed in, so we only receive from the school there are a few students then we determine the subject […]" (TVS-02).*

> *„[…] that is right, the management of the study program divides subjects for the internship students as well as the selection of supervisor teachers as well, so as much as possible for the selection of supervisor teachers, it rotates Sir for students at our school. The school will coordinate with the University […]" (TVS-01).*

> *„[…] yes Sir, first we as teacher call by school management about student's internship from university, then we will get a formal letter as supervisor teacher for the intern, after that activity I will have a meeting with my intern to discuss lesson plan […]" (TVS-04).*

After receiving an official application from the university, the school management carefully arranges teaching internship activities by appointing a supervising teacher for each student in accordance with their competencies. After appointing a supervising teacher, the school management fully hands over the management of teaching internships to each of the supervising teachers in accordance with the activity guidelines from the university.

5.2.1.2 Main Category Teaching Assignment

At the beginning of the implementation of this teaching apprenticeship, the head of the study program at SMK will determine the supervisor and teaching assignments for the student concerned based on the guidance provided by the University. Supervisor teacher will guide the intern to conduct the teaching assignment, regularly the supervisor teacher will give them opportunity to observe the classroom in advance.

> *„[…] During this time, before dividing the teaching assignments to intern students, supervisors usually look at the university's student internship guide (UPI)[…]".„[…]The internship manual is a benchmark of the internship periods for students to teach and what targets to do during an internship at school. Like now, for students who I guide at the beginning, they are welcome to compile lesson plans while observing the competencies taught at school[…]". „[…]Lesson plans are arranged according to the criteria they are asked to teach to students under supervisor supervision, around 16-18 meetings depending on the length of the program internship […]" (TVS-03).*
>
> *„[…]well, sir, usually, intern students from universities in our school will be assigned to C2 or productive subjects[…]". „[…]The next step will be given a schedule for mandatory face-to-face hours as much as six times in each subject assigned to the intern students, usually tailored to their respective study program's needs. Still, in general, they must enter the class a total of 6 meetings or adjusted to guide from the university[…]" (TVS-01).*
>
> *„[…]in my subject, usually, I will take my intern to my class to observe my teaching activity in theory and practice. This observation session was vital*

for them to analyse the student's characteristics and teaching style, after observation in my class, we will discuss how many meetings they must attend as university regulation [...]" (TVS-10).

„[...]I usually do the assignment at the beginning of the meeting with the student interns. Before dividing the assignment, I will give assignments at the two initial meetings, the internship students take part in the class when I teach, so I teach the students in the class while the student observes (sit in the back)[...]".„[...]Suppose he has made these observations, usually a good motivation from within him to teach students in the class. In that case, I do this because when directly teaching in class, the student intern is typically nervous about providing learning[...]".„[...]Next, if there have been two observations for the meeting, the apprentice student must make lesson plans (lesson plans)[...]".„[...]After the lesson plan is finished, students may appear in front of the class. That is the division of tasks that I applied to the student interns, sir [...]" (TVS 07).

In the preparation of teaching internship, the supervisor teacher will discuss the target with intern based on the teaching internship guidance from university, the intern will be a real time teacher in their teaching internship periods supervise by supervisor teacher at schools. They will teach in both theory and practical classroom.

„[...] Yes, it still refers to the obligation of 16 meetings, sir, so for the theory classroom, we give this internship opportunities for several sessions at the beginning of the semester before practical learning begins[...]".„[...]This theory learning not in sequence by all of them but interspersed by me as a supervisor teacher. If all theories can be conveyed before carrying out the practice, sir, and the number of theoretical classes is not required how many times, what is essential is that they conduct learning in theory classes, so sir [...]" (TVS-08).

„[...]the distribution for teaching will start with regular teachers come into the classroom to give lessons, as usual[...]".„[...] The student interns come to observe in the initial meeting. After that, there is a discussion between

regular teachers and intern students to be arranged plans, such as the
sharing of teaching hours between regular teachers and intern
teachers[...]" (TVS-08).

5.2.1.3 Main Category Lesson Plan Development

After the first meeting that discusses all the details of the teaching apprenticeship plan, then the apprentice teacher is given the task of preparing a lesson plan according to the agreement with the supervisor. after being approved by the supervisor, the lesson plans are used as the basis for implementing the learning process in the classroom. Lesson plans are prepared starting with an analysis of the curriculum and what subjects will be the responsibility of the apprentice teacher.

> *,,[...] as soon as the students arrive, I usually invite them to do curriculum*
> *analysis on related subjects[...]".,,[...] After that, they are determining the*
> *competency target to be taught, then preparing lesson plans. They are*
> *expected to count effective weeks[...]".,,[...]After that, the internship*
> *student may teach if he already has a lesson plan [...]" (TVS-01).*

> *,,[...] That is right, sir, so before teaching, they must prepare their lesson*
> *plans under the syllabus that applies in schools. After the lesson plans are*
> *finished, I, as a supervisor, decide at which meeting the students will teach*
> *[...]" (TVS-04).*

> *,,[...] in the preparation process, we provide them with guidance. At the*
> *beginning of the preparation, we will give KD (basic competence) to make*
> *lesson plans. Also, I provide examples of lesson plans applied in schools,*
> *then combined with theories obtained at universities[...]".,,[...] So later*
> *there must be a difference, well please the student who determines how the*
> *style will be[...]".,,[...]Well, usually, we want students to follow the lesson*
> *plan style adopted in this school [...]" (TVS-05).*

Supervisor provides directions in making lesson plans by the apprentice teacher so that it is in line with the plans that have been prepared previously by the regular class teacher.

„[…] usually, in the beginning, we ask them to make their version of RPP (lesson plan) first. After that, we adjust the RPP that is applied in our school. Indeed, what we see is often some different things in implementation. Usually, we will make the necessary adjustments […]" (TVS-03).

„[…] for lesson plan development, I, as supervisor teacher, gave them lesson plan example and KD (basic competence) in my subject, from that KD they must develop an indicator for detail material for the class both theory and practical […]" (TVS-04).

„[…] In the process, I give information about the KD (basic competency) in my subject, while the lesson plan style is released to the student according to the direction at UPI[…]".„[…] so I gave freedom to the students in preparing lesson plans to adjust to the supervisor at UPI […]" (TVS-01).

The lesson plans that are made must follow the existing lesson plans because these apprentice teachers will be involved in the learning process in the ongoing semester to provide the competencies needed by SMK students.

„[…] Yes, it is true, lesson plan must be the following activity that applicable at school, but in its preparation to determine the learning indicators in the lesson plan I give freedom to the student […]" (TVS-06).

„[…] in the development of lesson plan process by them, the lesson plan must be fit to school condition, I mean even intern students have the freedom to develop a lesson plan, but still, they must adjust to lesson plan stile that school has […]" (TVS-10).

„[…] the lesson plan must fit the school rules and regulation, but they always bring their style from university, so after their finished, I will check all the detail to make sure lesson plan is suitable with the subject […]" (TVS-08).

„[…] after they finished developing a lesson plan, I will check the lesson plan whether this is suitable already or not with my subject[…]".„[…] After everything ok, then the study program management will validate the lesson plan […]" (TVS-10).

The lesson plans that are made must get approval by the school management before being used by the apprentice teachers, and at the end of the apprenticeship program, the lesson plans become one of the evaluation subjects by the supervisor in providing the final grades for the apprentice teachers.

5.2.1.4   Main Category Teaching Role

In this apprenticeship program, although their status is an apprentice teacher, their roles and functions are the same as regular teachers in schools. they are obliged to carry out theoretical and practical learning in accordance with the agreement with the supervisor, provide guidance to vocational students when facing problems, conduct demonstrations in practical classes.

> *„[…] we ask them to have the same role as regular teachers, start with planning when they will carry out the class, do suitable opening activities, and end good learning activity, so we ask them to carry out the same tasks[..]". „[…]Although, in fact, sometimes, from my observations, there are some situations that they are not ready for, we certainly help sir to improve in the future […]" (TVS-06).*

> *„[…] from my experience, they were given full authority in practicum activities until assessment to students just like regular teachers, so they have the same duties and responsibilities that must be carried out and reported to the school […]" (TVS-02).*

> *„[…] their role is the same as mine. For example, there is a job sheet; first, I will explain to students how to do the practice; later, I give assignments to intern students to supervise students in the middle of learning[…]". „[…]The role of the intern students when our students are carrying out the practice, they go around to all students to check one by one, to make sure the practice activities are under the job sheet, later if something is wrong, they can take part to correct the problem […]" (TVS-05).*

> *„[…] for me, they must act like a regular teacher, even they are internship teachers[…]". „[…]Still, we treat them as a real teacher who has same responsibility with us, so they have made planning, conducting, and*

evaluating the teaching activity with giving a mark to students […]" (TVS-08).

Another task that must be done by apprentice teachers is to be involved in the process of evaluating the learning process that has been carried out together with regular teachers, they will assess vocational students according to the meetings that have been held during the teaching apprenticeship program.

„[…] Yes, of course, they were involved in students' evaluation, Sir. Because when we made the assessment scale, Sir, the assessment indicators were usually made by the teacher[…]". „[…]The instruments had been made from the beginning, Sir, so they just used the format to provide an assessment to students […]" (TVS-07).

„[…]Sir, they are involved in student evaluation because when we develop the evaluation scale, the evaluation indicators are usually set by the teacher, and the essay is created from the beginning, so they just use the format to provide the assessment[…]" (TVS-10)

5.2.1.5 Main Category Teaching Ability

Based on data obtained from respondents, the apprentice teachers already have pretty good communication skills in the implementation of teaching theoretical classes, this really supports the smoothness of the learning process in the classroom.

„[…] they have good knowledge in basic automotive, have good media for teaching activity and good communication skill with students Sir[…]"(TVS-01)

„[…]As an automotive teacher, the intern teacher that I supervise was had good communication skills in theory class, and they used modern methods and media to teach our students […]" (TVS-09).

„[…] according to what I said earlier, they already fulfil all the needs of the school sir, they have enough knowledge in terms of theory to carry out teaching assignments in class to students […]" (TVS-10).

„[…] their teaching activity in theory classroom I think already suitable with our needs, for example in my subject necessary lathe machining, they have suitable method and media for teaching activity, so students have a good time in their class […]" (TVS-03).

Regarding the mastery of theoretical knowledge, several respondents stated that the mastery of theoretical knowledge in the field of expertise still must be improved and in accordance with what is required by SMK. Many of the intern teacher still lack theoretical knowledge related with subject.

„[…] from my observation, in the implementation of the theoretical classroom, they still need additional competence. Especially for my subjects, these intern students must have more experience than just what they can get at university[…]". „[…]Because from what I see, most of these intern students know the theory of control refrigeration with manual techniques, in other hands in refrigeration technology, now have advanced technology, in this subject, there is a material called electronic control, what we use is a microcontroller[…]". „[…]Some are using PLC as learning material, well maybe in their lectures lacking in electronics, sir. So, intern students I guide will have additional knowledge about electronic materials in the internship program […]" (TVS-04).

„[…] their theoretical knowledge is still lacking, sir, especially in electronic materials, such as the basics of electronics, microcontrollers, and programming[…]". „[…]Most of them do not get material on electronics and programming for microcontrollers when they study at university, sir […]" (TVS-02)

„[…] according to my experience, they have good knowledge in essential car engine maintenance, brake system, fuel system, and old car system. However, for fuel injection and other modern technology, they are still not competent […]" (TVS-06).

All respondents stated that the apprentice teachers who did teaching internships under their direction had good basic level practical skills and could directly interact with vocational students in the practical class.

,,[…] from what I experienced, in my opinion, their skills are in accordance with the needs of the school. Especially in my subjects, what the internship students have both theory and practice is in accordance with the school's requirements […]" (TVS-10).

,,[…] what I see is their outstanding competence is that the mastery of the basic cooling system is already profitable and following the needs of the school, including the practical competencies as well, the core competencies related to the installation and electricity they already have a good ability[…]. ,,[…]But because the science of refrigeration continues to develop, especially from the control system, the internship students must continue to create new materials following the air-conditioning industry's progress […]" (TVS-06).

,,[…] From some experience, sir, most of them already can practice in the subjects that I am capable of[…]". ,,[…]Because on average, before they teach at the school, they have gotten debriefing from the university sir, such as industry experience and daily practicum at the university […]" (TVS-09).

,,[…] yes sir, they can transfer knowledge to our students, maybe my subject is still basic science, so it is easy for them to carry out their assignments as practical teachers, sir […]" (TVS-10)

,,[…] In my opinion, the practical ability is almost the same as the level in the school, sir[…]". ,,[…]I think the activities on campus are like those in the school, sir[…]". ,,[…]For example, in the air conditioning system subjects, when they were teaching the practice of installing a split AC, they can do demonstrations to students in terms of electricity or piping […]" (TVS-05).

From data obtained shows that's practical skills from intern teacher are not enough for teaching activity for all subject related, from 10 interview all states that the intern teacher not ready to demonstrate practical skill at class 12.

„[…] for practical skills, I think they must make improvements in advanced machining because from what I see, they still struggle to make gears in Frais machine, grinding, and advance lathe machining […]" (TVS-02).

„[…] for the practical class, from my observations in the cooling system unit or maintenance subject, it is indeed quite useful because the subject content following the material in lectures at the university[…]". „[…]But as I said before, sometimes we are dealing with equipment with the latest electronic system, which is usually a problem for them and time to repair in practice longer than usual[…]". „[…]So, if the student understands the theory of electronics, he will be a little faster for troubleshooting, so in my opinion, sir […]" (TVS-03).

„[…] from my experience, they usually need more time to use the equipment, unable to use the tool directly[…]". „[…]So, in the practical learning activity, interns are still learning how to use the tool, which resulted in a slightly inhibited learning process, maybe it could be due to differences in the tools and equipment used at school and university […]" (TVS-04).

„[…] In welding techniques, it seems that campus may not be too intense in practice[…]". „[…]When they teach our students, interns are usually demonstrated at intermediate levels such as welding positions 2G and 3G; they have less confidence because they have not fully mastered these competencies. But for basic welding techniques, they are quite confident[…]". „[…]Especially for flat or fillet positions such as 1F and 2F, they are sure to conduct demonstrations. But for a 3G position or above, they are still not competent. Especially for teaching in 12th-grade students who already have competencies beyond the competencies of intern students […]" (TVS-02).

„[…] from my experience, when they conduct practical sessions, they have adequate skills to supervise students in the workshop[…]". „[…]Still, for advance, the task is far away, they do not ready sir, I think maybe they do not have enough practice time in university […]" (TVS-04).

„[…] in my opinion, at least the intern students must have at least the same competency as the competency scheme that our students must have[…]".

„[…]For example, the Ministry of Education and Culture's scheme now for SMAW in 3G position for GTAW positions 1G and 1F for GMAW 1G and 1F[…]". „[…]So minimum, they must have that competency package for teaching in schools[…]". „[…]We hope those intern students should have more competence than students in school[…]". „[…]Still, until now, the average university graduate has competency at the basic level. In practice skills, if they teach at the elementary level, it is enough to make a start teaching assignment, that is my opinion […]" (TVS-05).

„[…] From my observations so far, it can be said that the mastery of the practice skills is less than 50% sir, so we regular teachers must always guide and give examples to them, we cannot just let go while teaching practice in the workshop […]" (TVS-07).

„[…] from my opinion, they have good knowledge in theoretical in basic automotive, especially in the light vehicle system[…]". „[…]However, they still must improve their practical ability. I mean, they must have more experience in maintenance related to the national standard […]'' (TVS-03).

„[…] as I told you before, they have good demonstrations skill in basic machining, so in this subject they can make good transfer skill to students in the workshop, and the learning process is suitable with the lesson plan, but for the subject in 12th grade, they not ready […]" (TVS-09).

„[…] for my observation, they ready to teach the subject in 10th grade and 11th grade in basic machining technique, for the other subjects in 12th grade, I think they need more skill in practical competency or industrial experience would be better […]" (TVS-07)

Many of the apprentices have difficulty using equipment in workshops due to differences between equipment at the university during study and equipment at school.

„[…] I do not think it is a big problem, it is just because of the difference in equipment at the university with the equipment in our school, making there is extra time for intern students to learn the function of the equipment before doing demonstration while teaching practice […]" (TVS-05).

„[…] in general, they have useful competence, is just need time to adjust with tools and materials in school, and then after that, they can conduct assignments as an intern […]” (TVS-06).

„[…] the only problem now was an electronic skill not appropriate[…]”. „[…]In the past, when I was in college, electronics subjects were only general knowledge[…]”. „[…]But currently, most of the electronics are specialized in refrigeration, such as temperature control and room humidity[…]”. „[…]The peculiarities in air conditioning techniques are always electronic. So, they must get better electronic material while in lectures at universities to keep pace with industrial development […]” (TVS-01).

5.2.1.6 Summary

- The implementation of the teaching internship program at SMK for prospective teachers is useful for providing field experience in the learning process
- The intern teachers have sufficient knowledge in the field of pedagogy as a provision for teaching at SMK
- Intern teachers have good social attitudes in adapting and communicating in the school environment
- In its implementation, the apprentice teachers already have good methods and media in teaching in the classroom.
- Intern teachers have good confidence when teaching the theory class in grade 11.
- Intern teachers can demonstrate practical skills in grade 11.
- Intern teachers have shortcomings when teaching advanced theory in grade 12
- The practical skills of the intern teachers still do not meet the requirements for practical teaching in grade 12.
- Intern teachers are involved in the evaluation of vocational school students at the end of each semester

5.2.2 Activity of Practical Learning Process at TVET Faculty

The second sub research question seeks to find out, how is the activity of learning process at TVET faculty conducted. To do so, the following interview data have been analysed. To get better understanding of the problem at hand, the following main categories with respective codes have been set out and carefully investigated.

5.2.2.1 Main Category Curriculum Development

In the learning process on TVET faculty, all activities are based on the curriculum set by the university through development carried out by involving lecturers who teach in each study program. Curriculum development is determined once every 5 years by the university although every year adjustments are also made if necessary.

> „[…] for curriculum development, every year, there is always a development process according to the development of the industry[…]”. „[…]Still, institutionally at the university, there is a scheduled once in 5 years to revise the curriculum, so every year, there is also curriculum revision[…]”. „[…]The revision of this curriculum is based on inputs, one of which is from industry, specifically the automotive sector or users. This undergraduate program aims to generate prospective teachers, so we are accepting input from the vocational school of its users, from industry, and vocational training center[…]” (UL 1).
>
> „[…] regularly the curriculum development in UPI set up once in 5 years[…]”. „[…]Still, in implementation, we also made changes yearly when we feel that the curriculum must adjust to industry development or new standard in expertise […]” (UL 5).

Curriculum development carried out based on graduate competency standard and refers to the National occupation standard (SKKNI) and the school's

need for competent vocational teachers, and for some fields there are those that refer to international standards because national standards are not yet available.

„[…] so, first in the drafting of the curriculum, we refer to competence that the vocational schools (SMK) students should master, so as an example in mechanical engineering program it is split into six major, there's machinery, welding, fabrication, casting techniques, aircraft technique, and engineering drawing[…]". „[…]The curriculum we form in my faculty refers to the study program at SMK, among which we take weight in the later existence of students who choose machinery, casting, or welding techniques, and engineering drawing[…]" (UL2).

„[…] The standard made for curriculum development is based on the graduates' quality, we called graduate competency standards, and it was made during curriculum development sir […]" (UL 4).

„[…] actually, for the pneumatic hydraulic, I took responsibility for curriculum development[…]". „[…]Usually, we will be connecting the curriculum with the National Occupation Standard (SKKNI) and the development of industry and researched through the internet its materials […]"(UL 7).

„[…] So first we are referring to vocational school (SMK) needs because our students are oriented to be SMK teachers, the second we also believe the subjects in SMK refer to SKKNI sir, then the courses we put together starting from 2018 are referred to National occupation standard (SKKNI) Sir […]" (UL 2).

In its implementation, curriculum development is carried out involving lecturers who teach at the faculty as well as inviting industry and vocational teachers to monitor and provide the necessary inputs.

„[…] all lecturers are involved, long before there is a department of automotive engineering, we still have a group of areas of expertise or automotive specialization, every lecturer that is all discussion about this curriculum, so all lecturers are involved […]" (UL 1).

„[…] in the process, all lecturers will involve in curriculum development as faculty asked[…]”. „[…]We will invite all stakeholders related, such as industry, vocational school principals, and other vocational education institutions […]” (UL 5).

„[…] The curriculum we form in my department refers to the study program at vocational schools (SMK)[…]”. „[...]We will regularly invite all stakeholders to discuss curriculum development for a better result. We will ask all developers, "what would you like to be a teacher in SMK?" […]" (UL 9).

From 10 interviews they stated that curriculum development is something that is routinely done by every lecturer to improve the learning process carried out and to connect the classroom with users, in this case SMK.

5.2.2.2 Main category learning strategy

The learning process carried out refers to the curriculum in effect in the current semester, the lecturers carry out the learning process based on the set course objectives, so the lecturers must convey theory and practice in the subject concerned. based on the interview data all interviewee states that the theory learning hours higher than the practical learning.

„[…] in our faculty, the comparison between theory and practice may vary among subjects, especially in my subject the comparison was 60 % theory and 40 % practice, this in line with the curriculum we have currently […]" (UL 5).

„[...] regarding the learning process in our department, we are here according to the curriculum, 60% theory, and 40% practice[...]”. „[…]Students will learn theory at the beginning of the semester then they will practice after that […]" (UL 6).

„[…] Yes, for clearness, I must look at the curriculum document first, but from what I know at the moment is that the comparison of theory and practice is approximately 30 percent practice and 70 percent theory[…]”. „[…]For more details, we must look at the curriculum, Sir […]" (UL 4).

To achieve the targets, set in each subject that is implemented, the learning process carried out refers to the CBT concept even though the proportion of practical classes is lower than the theory class. By using the CBT concept, it is hoped that the maximum results can be achieved to prepare students to become competent teachers.

> „[…] So, we conceptually conducting competency-based training, so we practice competence-based in practical activity in our workshop, which refers to national occupation standard (SKKNI) […]" (UL 1).
>
> „[…] Oh, the concept does not change, sir, it is still CBT. Still, the achievement of competency is as much as possible, so I will give all lessons as shown in the lesson plan[…]". „[…]For the practical class at the end of the lecture, the target of the assignment is not 3G anymore, for example, because of limited time and funding, and this is no control from anyone, this is the real condition, sir […]" (UL 4).
>
> „[…] in the refrigeration and air conditioning, the learning process was focused on competency achievement related to the job sheet[…]". „[…]In other words, yes, we still using CBT as usual, but for some subjects, we also conduct work-based learning because students will learn in the industry, but not many subjects, just view of them […]" (UL 5).
>
> „[…] The concept of our learning based on the existing curriculum is CBT, we blend with experimental study, but the theory remains at the beginning of the next meeting, it has already been given in the form of a job sheet they had to complete at the end of that lecture, overall, 16 times the meeting […]" (UL 8).

The learning target for all lecturer in practical learning process were to prepare the students become a competent TVET teacher who ready for teaching in Secondary vocational schools (SMK), this target is the basis for the learning strategy developed.

> „[…] as a future automotive teacher, they should educate students to become a professional mechanic after they become a professional

mechanic[…]". „[…]They should be able to transfer their knowledge. So, we give the practice so that students can reach the senior mechanical level, understand the materials, etc., then be assisted by teachers […]" (UL 1).

„[…] to prepare our students as competence teacher in vocational schools, the learning process we conducted were based on school needs as shown in certification scheme level 2 and 3[…]". „[…]In the refrigeration and air conditioning field we will prepare them as a technician who able to repair and maintain the air conditioning unit in a house or building […]" (UL 5).

„[…] we prepare them to become welding teachers, so our students will receive knowledge on how to become professional welder in daily practice[…]". „[…]Regarding the target, in our curriculum, they must achieve the 3G (vertical) position, then they also learn pedagogical knowledge […]" (UL 8).

„[…] in our department, we train students as professional mechanics in maintenance or become professional metal cutters, so based on our curriculum, students will practice how to conduct maintenance and repair as well as metal cutting practice in lathe machine, and CNC […]" (UL 9).

5.2.2.3 Main category learning preparation

The preparation of the learning process that is carried out involves all related parties to support the smoothness of the practical learning process in the workshop.

„[…] Well, to prepare for practice learning, we usually do that at workshops by coordinating with Lab assistants (PLP), so they prepare all equipment and materials[…]". „[…]Then, the lecturer schedules the practice learning. Then we do a practice that usually always uses a block system, the delivery of theoretical material at the beginning of the meeting, almost 5 to 6 meetings for preparation. After that, we conduct the full practice […]" (UL 1).

„[…] particularly, in the refrigeration and air conditioning lab, we have one lab assistant at each workshop for conducted learning preparation[…]". „[…]Their task was preparing tools and materials for the practical learning process[…]". „[…]Also, help the lecturer in carrying out

the practical activity[…]". „[…]When there are students' questions, it can be supported by the lab assistant other than the lecturer because they also have the competence to use the equipment […]" (UL 3).

„[…] Oh, we prepare our practice with lab assistant (PLP), sir. It helps following the semester lesson plan (RPS) so that it is not full by the lecturer[…]". „[…]The head of the workshop will convey to the management of the study program[…]". „[…]In fact, the material needs will not all be met due to limited funds after the funding received by the head of the workshop then delivered to the lecturers to be discussed what cost can be fulfilled, sir. Well, that is what makes the target changes […]" (UL 4).

„[…]the needs of practical learning material and tools at laboratory/workshop would be prepared by the lecturer with help from lab assistant (PLP), and propose to head of study program for budgeting, we always tried to prepare as curriculum demands […]" (UL 9).

„[…] regarding the preparation of practical learning process, at the beginning of the semester, lecturer sends a request for materials and tools to head of study program then send it to the faculty, commonly the faculty will decide whether enough funding for all job sheet or not […]" (UL 10).

„[…] We coordinate with a lab assistant or head of the workshop, and there are some problems with funding because the funding is not enough for all demands[…]". „[…]the equipment will be available after the procurement, but there are no maintenance costs after, although our request for materials or improvements is proposed to the head of the lab […]" (UL 7).

The learning process is fully scheduled by the lecturer concerned based on the amount of material available and the competency targets that must be achieved by students.

„[…] students will contract several subjects in one semester mixed pedagogical and technical subject and based on that contract I will develop the schedule for all students[…]". „[…]commonly we just have a view student in refrigeration department maximum was ten students, based on

that schedule students would conduct the practical learning with lab assistant and lecturer with personal assignment […]" (UL 5).

„[…] practical learning schedule developed by the lecturer that agreed by students, so from the schedule lab assistant will help the practical learning process, so students do not lose the opportunity even though the lecturer has other activities, it remains implemented because the lecturer gives a long enough time to carry out student activities […]" (UL 6).

„[…] Yes, we just set the schedule, sir, because it is impossible to conduct a block system, sir, because they also have another course[…]". „[…] so we will let them choose in one week that will be on what day we adjust, sir […]" (UL 7).

The lecturers plan learning activities in the workshop based on the situation and characteristics of the field of expertise, such as the number of students, the availability of practical tools and materials, the number of lecturers, and the schedule they have.

„[…] we will teach all the basic subjects in the first year for all student[…]". „[…]After that, they will decide which area of expertise they desire to be their future area of expertise but to balance the concentration in mechanical engineering department lecturer adjusted if there is unbalance in students' number among concentration […]" (UL 5).

„[…] to achieve either at level 4 or for those at level 6, the practice pattern we take a rotation sir for example in welding there is basic welding, and other courses[…]". „[…]Because of the limitations of the tools, then we conduct rotation, sir, then automatic work-hour reduction occurred, but I admit that students will just reach level 4 maximum […]" (UL 2).

„[…] because we always want to be ideal and in fact, it is not always ideal because the practice in the automotive is relatively high cost, indeed with high cost, it has become one of the problems to achieve the target[…]". „[…]secondly, the technological development is very fast, so we cannot follow sir […] (UL 1).

[…] so, for the beginning, I give them a fundamental theory in the classroom, then the practical learning began by introducing them with equipment's then the components contained in the field of air conditioning technology[…]". „[…]After that, they will exercise assembling the air conditioning components[…]". „[…]In all practical learning, they must observe all assignments in the workshop […]" (UL 3).

The learning process is carried out by providing theoretical knowledge as a basis for practicing in the workshop. To achieve the level of expertise that must be achieved, the lecturers develop their respective learning plans based on the existing situation and conditions.

„[…] every semester, all lecturers should develop Semester Lesson Plan (RPS), and this will be the basis of the learning process in a related semester[…]". „[…]The RPS and syllabus have several targets set regarding the student's achievement, but in the end, it depends on the situation (funding, time, tools, and materials) […]" (UL 1).

„[…] So, sir, regarding the course, each lecturer is required to arrange a semester lecture plan (RPS) per semester[…]". „[…]The development of this RPS is made by each lecturer related to the subject[…]". „[…]I arrange the RPS, try to integrate the National Occupation Standard (SKKNI) units with the subject, and then compare it to the National Framework (KKNI) level[…]". „[…]I will see what level must achieve by people who graduated with a bachelor's degree, and I try to make it like that, Sir […]" (UL 4).

[…] but this semester lecture plan development will be returned to the lecturers of each subject, so it varies, so all the targets are centered on lecturers as developers of the semester lesson plan (RPS) with given signs by the study program management for example in each subject there is a description stating that students must be able to do something on the course[…]". „[…]Still, the contents of the RPS are submitted to the lecturer. In the process, even though there are signs for the preparation of the RPS lecturers in preparing the RPS, there is no control from study

program management to check the RPS suitable with guidance or no [...]"
(UL 4).

5.2.2.4 Main category practical learning process

In its implementation, the practical learning process carried out in workshops by lecturers sometimes has collaboration with industry for student practice, but the collaboration is based on innovations from each lecturer, not from a planned system from the management.

> *,,[...] there is some cooperation with the industries, usually from our alumni, we have a partnership with Robert Bosch for an advanced course in the fuel injection and common rail systems. Also, we got some tools from the industry as a donation [...]" (UL 1).*

> *,,[...] from 2019, we have a partnership for practical learning in CNC machining course with SMKN 2 and SMKN 6. students who contract CNC machining course must take an apprentice program in those SMK sir[...]".*
> *,,[...]Also, in some learning processes in school, they became an assistant teacher, sir [...]" (UL 2).*

> *,,[...] currently, I am active in one of the small metals cutting industries. We can assist student I teach who relates to machining techniques and their practice in the mechanical engineering workshop[...]". ,,[...]I offer them to join the internship program in my company, and the internship is not six months, sir but one year because they can later obtain a job certificate for a one-year internship [...]" (UL 2).*

> *,,[...] previously in several courses, I collaborated in the field of material testing, but now because the tools already exist, there is no collaboration anymore[...]". ,,[...]It is just the ratio that is still insufficient with the number of students [...]" (UL 4).*

> *,,[...] we have several cooperation with refrigeration and air conditioning industry to conduct some practical learning process because we have alumni worked in related industry, it helps us to bring our students to industrial experience [...]" (UL 5).*

The lecturer gives practical assignments to students based on job sheets that are adjusted to the availability of tools and materials during the preparation stage. This form of task is a personal task even though the work is carried out in a work group due to limited tools and materials.

„[…] for the assignment, it is in person, but the implementation was in a group[…]". „[…]Although one engine stand was 3 or 4 students, the job was in person[…]". „[…]So, in the process of practice, all those students should be able to overhaul the engine[…]". „[…]On the engine tune-up practice, also there are practices in groups, but eventually, all those students should be able to tune-up. That is how we get around the limitations of tools and materials […]" (UL 1).

„[…] it is mostly personal tasks, sir. As in my courses, all are just individual assignments, because if I give them group assignments, it hard to know which ones students have a good work or not sir […]" (UL 2).

„[…] the practical learning assignments are usually personal for equipment or machines that have sufficient ratio, sir[…]". „[…]Still, once there is a ratio of machines that lack the example of gear making, so we give assignment one job sheet for two students, we try no more than two people, so we prioritize personal assignments, sir […]" (UL 4).

„[…] the student's assignment always a personal assignment, because we have enough number of tools and machines as required on the job sheet, in the process the achievement of assignment, varied among students it depends on their motivation and willing to learn […]" (UL 5).

„[…] the assignment is independent (personal) sir, it depends on the job given, if the job is made to work together with the group, it is made in a group […]" (UL 6).

To achieve the target set, some limitation related to the tools and materials face by lecturer and this situation influence the target changes become lower than expected

„[…] In our job sheet, there is a target that must be finished until complete, in CNC workshop we only have training units for 2 and 3 axes, the only

constraint is now in our machine it is still Austrian aid from 1992 so is
already too old, with that kind of problem[…]". „[…]Our job sheet is
reduced, regularly we have eight job sheets, but now it is just four job sheets
due to limit the CNC machine, two job sheets in TU2A then two more in
TU3A […]" (UL 8).

The evaluation is carried out by the lecturer by paying attention to the process carried out by students during the practical learning process in the workshop. The evaluation is carried out starting from the value of daily observations by lecturers, product assessments, and final semester exams. All these variables are processed by the lecturer and will produce a final score for each student.

„[…] the evaluation made to the student is made holistic. It consists of
attendance, Middle semester test (UTS), Final semester theory test (UAS),
presentation, and practice[…]". „[…]The attendance must be 80%, sir. At
the end of that semester, we usually will do a practice test, same with a final
examination (UAS), to gain student final grade […]" (UL 3).

„[…] there is a daily observation, namely the assignments evaluation given
to each student and then combined with the final scores sir, the practice
exam is for psychomotor, sir[…]".„[…]We also see students working
attitude in daily practical learning takes place[…]".„[…]For cognitive,
there is a written test in the form of a final semester examination […]" (UL
4).

„[…] students will have final grades based on daily activity, middle
semester test, final presentation, and practical test at the end of semester
[…]" (UL 5).

Beside the evaluation process for grading, there is an assessment and certification process conducted but based on the lecturer policy not by system from university as regulation. Third party certification conducted especially at automotive field, and the others field were not conducted yet.

„[…] yes, yesterday we had a competency test for students, we have cooperation with APTO (association of automotive engineering professions), this competency test was for tune-up levels, we had time to use that and given certificates from APTO […]" (UL 1).

„[…] currently, we cannot pursue the assessment test because it has to do with inadequate financing[…]". „[…]We were trying to take the competence test from National Body for professional certification (BNSP)[…]". „[…]Still, it turns out that the cost is too high for our students, so the department cannot afford to do the competence test process […]" (UL 3).

„[…] Well, for third-party certification, until now, we have not implemented it, sir[…]". „[…]Now we are currently trying to become an LSP (assessment institution) and still process to be submitted to BNSP, so we can come carrying out competency tests under BNSP regulation, but the reason is currently insufficient funds to do this[…]". „[…]Still, many students also carry out their independent competency tests […]" (UL 4).

In their daily activities in the workshop, the lecturers face various challenges that are not easy to face, such as limited practical tools and materials, the number of students who exceed their capacity, the background of students from public schools, and insufficient practice hours to meet the target of curriculum.

„[…] the weakness in our department is the number of machines and tools we had in our workshop to support all students[…]". „[…]With this kind of problem, we cannot guarantee maximum to service our students to achieve the target set in the curriculum, so this infrastructure problem already discusses in several meeting with the faculty, but until now we still solve it, sir […]" (UL 2).

„[…] from my observations so far, commonly, we view technical manners from students who were not used to engineering practice before[…]". „[…]Because they were from general high schools, it was necessary to habituate and emphasize workshop tools[…]". „[…]Also, there were still students who were negligent at the practice that should continue to be

familiarized because what they work on in that workshop is different from studying in the class [...]" (UL 3).

,,[...] main problem in refrigeration was updating a learning media[...]". ,,[...]We should do further development for the better learning process, all along if we use that learning media conventionally than we struggle to achieve the target, this situation happens because of the limitations of funds as well as the difficulties in procurement of tools and machines [...]" (UL 3).

,,[...] for example, in welding techniques, I have a target for students to reach 3G welding position, then after we have the funds[...]". ,,[...]Not enough for all needs and time is impossible for conducting all practical lessons and considering the ratio of tools and students. The maximum can be achieved at the practical welding lesson on 2F position, sir [...]" (UL 4).

,,[...] so, in the refrigeration department, the biggest problem was updating tools and machines in the workshop[...]". ,,[...]Yes, we have enough tools for practical learning[...]". ,,[...]However, all devices were old technology is just enough for basic but advanced technology in refrigeration we still cannot provide to our students [...]" (UL 5).

,,[...] the development of training facility should be the focus in our department We also lack lab assistant[...]". ,,[...]The existing workshop is only nine units, and there are only three lab assistants[...]". ,,[...]Fortunately, the workshop does not run simultaneously, sometimes just 4-5 labs active, and sometimes there is a lab assistant that handles 2-3 labs [...]" (UL 8).

5.2.2.5 Main category teaching internship program

After reach semester 6, students must be conducting a teaching internship at vocational school to gain experience about the real classroom activity as one of the requirements for graduate from the program. this teaching internship held in 3 months supervise by lecturer together with teacher supervisor at school. To apply this program students must have passed several subjects in early semester both pedagogic subject and practical subject.

„[…] the Teaching Internship (PPL) terms are from the field of study, and primarily, the students must first complete all the pedagogical (MKPBM's) courses[…]". „[…]All those PPL students were done with all their lecturers as supervisors, sir; hence, after completing the PPL, they could start working on the thesis […]" (UL 2).

„[…] usually, the teaching Internship (PPL) student who is already graduated from all courses[…]". „[…]So, they must graduate first in pedagogic subjects[…]". „[…]So, they had to master the materials on the pedagogic courses, then could do teaching practice in vocational school […]" (UL 3).

„[…] in terms of UPI rules, there is no such thing requirement before students do an internship at school, so in UPI, the requirement is that students must pass some courses in the previous semester[…]". „[…]Maybe it also includes practical competency[…]. „[…]Still, there are no prerequisite competencies before internships to school, just graduating several courses in the education field and other subjects, like that sir […]" (UL 4).

„[…] well, the teaching internship for students usually in the 7th semester after they pass the pedagogical subject and industrial internship[…]". „[…]UPI has an agreement with several vocational schools (SMKs) to conducting teaching internships for our students. We are the lecturer will be a supervisor for these students […]" (UL 5).

Before students carry out the teaching internship at school, lecturer make a preparation to enhance the students confident and motivation when they arrived at schools.

„,[…] of course, first, we assist students before they go to school for a teaching internship[…]. „[…]We do the monitoring a few times, then mentoring both in learning media and teaching materials, then there is a teaching test or exam at the end of the program […]" (UL 1).

„[…] we have some partnership agreements with some high schools, so it should be chosen schools that are already established cooperation with UPI

sir[…]”. ,,[…]So, we consider decent schools and can provide a good experience for the students […]” (UL 1).

The purpose of implementing the teaching apprenticeship program is to provide real experience from the field how to carry out face-to-face with students in vocational schools, give them experience of dealing with vocational school student problems, increase self-confidence in teaching and provide an overview of the duties and responsibilities of a vocational teacher.

,,[…] this teaching internship (PPL) activity is beneficial as a medium of student introduction to the real world that will be taken later after graduation, so students will later gain experience of how natural conditions in the school are[…]”. ,,[…]How the problems that happen exist, and what kind of obstacles[…]”. ,,[…]Well, from those dives, our students can take good learning by the time they become teachers later […]” (UL 1).

,,[…] for the Four Pillars of teacher Competence, it is enough, sir, especially for the pedagogic competency it is common for our student to be in the classroom[…]”. ,,[…]For practical learning, some students have good adaptation but some others not, but usually they can do so in 3 months sir[…]”. ,,[…]for their social competency, maybe the student who would have done PPL would have prepared for how to become a teacher entirely[…]”. ,,[…]The only problem with practical competency is that CNC practice skills are still far from expected […]” (UL 2).

,,[…] from my experience as an internship supervisor, we have a useful review from schools regarding the students teaching internship[…]”. ,,,[…]They can smoothly conduct the learning process in the 10th and 11th grades[…]”. ,,[…]Still, for the 12th grade, there were several subjects that our students must have to learn, especially the electronic subjects […]” (UL 5).

5.2.2.6 Summary

From the data obtained at the time of the interview, there are the following facts:

- Curriculum development is compiled periodically and incidentally as needed, and involves lecturers, industry, and schools as input providers.

- In fact, the compiled curriculum does not fully refer to the SMK curriculum, as evidenced by the types of courses that are still too broad and general and do not specifically refer to technical competencies.

- The comparison between theoretical and practical learning is still greater in theory, namely between 60-70 percent.

- The need for practical tools and materials is not fully provided by the faculty management due to the lack of available funds for practical learning process.

- Comparison of the amount of equipment with students is still not ideal for production and construction engineering and automotive majors.

- The existing practice schedule does not match the number of job sheets that must be completed

- Due to the lack of practical materials, the lecturer does not assign students to complete all the job sheets that have been compiled.

- Practical assignments are mostly carried out in group mode due to the lack of tools in certain courses.

- There has been no implementation of competency certification from third parties that can measure students' technical abilities.

- There are several collaborations with industry that were initiated by lecturers without any support or regulations from the university.

6. Discussion of the research result

In the following chapters, first, the Kind of skills deficit held by prospective mechanical engineering teachers (chapter 6.1) and second, factors influence of practical skills deficit of prospective teachers (Chapter 6.2), which were extracted from the interview material in the context of inductive category formation (sub chapter 5.2.1 and 5.2.2), are presented. Discussed and classified about the theoretical framework conditions of the present work set out in chapter 3. The focus here is primarily on the ten main categories formed with their associated sub-categories. Subsequently, recommendations for action are derive about the extent to which the knowledge gained can be used to develop learning activities at TVET Faculty, it can produce teachers with skills that match the needs of SMK.

6.1 Skills Deficit of Prospective Mechanical Engineering Teachers

Becoming a vocational teacher in Indonesia, especially in vocational high schools, is required to have practical skills in accordance with school needs because the education system implemented at SMK is school based, therefore the implementation of the learning process both theory and practice is carried out in SMK as a whole, and the teacher in charge required to have practical skills to guide vocational students in achieving the competency targets that have been set in accordance with the applicable graduate standards nationally. Productive teachers are tasked to train students to have working competencies according to the Indonesian National Working Competency Standards (SKKNI) and make students become qualified skilled workers in specific jobs that are suitable for industrial needs. They teach subjects that are following the competencies that are the main elements of Vocational Secondary Schools graduates. Responding to the demands, productive teachers in Indonesia must have theoretical and practical abilities (Surono and Wagiran, 2016, p. 107).

To answer the research questions, this sub chapter will discuss the findings obtained from interviews with respondents and discuss together the related basic theories. In this sub-chapter the discussion focuses on what skills deficits the vocational teacher candidates have based on the results of interviews with

supervisor teachers. The discussion of research results in this sub-chapter was carried out to discuss the evidence of skill deficits possessed by prospective vocational teachers based on field evidence during their teaching assignments in the teaching internship program at SMK's. From the seven main categories resulting from the inductive category development process in the first sub research question, this sub chapter will discuss the main categories related to the second sub research question which is main category teaching ability.

6.1.1 Main Category Teaching Ability

The 21st-century approach is learner centered and activity-based. The different methods or approaches a facilitator can use in facilitation outlined herein are cooperative learning, experiential learning, individualized learning, and facilitator guided whole class facilitation. In implementing an innovative pedagogy approach in a 21st century implies that the role of a teacher will change to a facilitator which indicates a shift from a teacher-centered to a learner-centered approach to learning as shown in Figure 3.8 There is a wide range of facilitation methods that can be classified in different ways. Any instructional method used in facilitation of learning with learners has advantages, disadvantages, and requires thoughtful planning (Doherty, et. al, 2019, p. 20). TVET Teachers must be enabled to link closely with the world of work and local/regional communities/society to identify the real training needs and to develop appropriate training programs as well as for youth, adolescents and adults" (Stolte, 2006, p. 25). In current situation, Spöttll (2009, p. 5-6) described that as TVET Teacher He or she must fancy his or her students, he or she must identify himself or herself with the school, he or she must be able to work under psychological pressure and should be curious!

Apart from this – and this is more or less self-explanatory – a teacher must be:

- a social worker,
- a psychologist,
- a mediator,
- a communicator,
- a team worker,

- an expert,

- a "knowledge networker".

Teachers who are good at communication, classroom management and appropriate subject technology will create a positive learning environment. Although it is important to be proficient in your subject area, it is important to communicate the necessary skills and concepts in a way that students can understand. Over time, teachers will develop skills through best practices, continuing education, and classroom experience shared with other teachers. Graduate students from TVET faculty are required to play multiple roles throughout the education process and learn many different skills. For various reasons, students need to prioritize roles and development skills that they can accept, while leaving some important skills that have not yet been developed. The ability to teach effectively is certainly a requirement for a prospective vocational teacher in carrying out daily duties as a vocational teacher at SMK. in this case the teaching internship program for prospective vocational teachers is very important to be able to evaluate the abilities that are already owned and the abilities that are still not suitable or are not mastered by the prospective vocational teachers. In essence, every prospective vocational teacher certainly has advantages and disadvantages depending on the knowledge gained during the education and training process at the university. However, with the urgent need for competent teachers who can carry out the effective learning process in SMK, especially in practical subjects, the SMK hopes that prospective vocational teachers from universities are able to answer these challenges when they graduate and earn a degree.

As vocational teachers, apart from being required to demonstrate technical skills to students in the classroom, they are also required to be able to carry out the theoretical learning process as a basis of knowledge in practical activities in the workshop. The ability to teach theory is as important as practical teaching because an understanding of the basic theories of a skill is fundamental to students before they carry out practical learning activities. Sink (2014, p. 190) remind us that cognitive theory will assist the learner to obtain the thinking techniques to improve performance in the job. Harasim (2017, p. 3) pointed out that theory is an explanation of why things happen or how things happen. She defines learning

theory as a theory designed to help us understand how knowledge is created and how people learn. Lefrançois (2019, p. 9) writes that learning theory aims to systematize and organize knowledge about human learning. He believes that powerful learning theories are designed to explain behaviour, predict behaviour, and even shape or change learner behaviour. Some of respondents described that the intern has a good skill for teaching theory to SMK students.

> „[…] they have good knowledge in basic engineering, have good learning media for teaching activity and good communication skill with students Sir […]" (TVS-01)

> „[…] I think the teaching ability in the cooling system is already good and in accordance with the needs of the school, the mastery of the theory also they have understood it well because the theory at the vocational school level is easier[…]". „[…]so actually, for the intern students, the theory level is higher than the junior high school students, but from my observations, the intern student is still lacking in confidence in performing and the technique of delivering material to students […]" (TVS-05)

> „[…] from my experience as a machining teacher, intern teacher that I supervise had good communication skill in theory class, they used modern method and media to teach our students […]" (TVS-09)

> „[…] according to what I said earlier, they already fulfil all the needs of the school sir, they have enough knowledge in terms of theory to carry out teaching assignments in class to students […]" (TVS-10)

Theory provides a basis for understanding the way people learn, and provides a way to explain, describe, analyse, and predict learning. In this sense, a theory can help us make more informed decisions around the design, development, and delivery of learning. specifically in vocational education, theory is the basis of knowledge that is important and must be understood by someone before they carry out a practice in a practical job. Effective teaching and learning in vocational education objectives must consider the various variables that influence knowledge formation, and which promote more advanced learning. Given these many variables, the formal sector of technical and vocational education and training

(TVET) must continually ask itself what can and should be developed to better provide the vocational learning process for people who are likely to continue learning through the informal sector. According to some respondents, in context of the theory teaching ability some interns need to develop their knowledge in some area of skills.

> „[…] from my observation, in the implementation of the theoretical classroom, they still need additional competence, maybe, especially for my subjects[…]”. „[…]These intern students in my subjects must have more experience than just what they can get at university, because from what I see, most of these intern students know the theory of control refrigeration with manual techniques, in other hands in refrigeration technology, now have advanced technology[…]”. „[…]in this subject, there is a learning material called electronic control, what we use is a microcontroller and some are using PLC as learning material, well maybe in their lectures still lacking in terms of electronics sir […]” (TVS-04)
>
> „[…] their theoretical knowledge is still lacking, sir, especially in electronic materials, such as the basics of electronics, microcontrollers, and programming[…]”. „[…]Most of them do not get learning material on electronics and programming for microcontroller when they study at university, sir […]” (TVS-02)

In a sense, a theory also called knowledge is something you must read or understand before you must act in a certain way. The level of theoretical knowledge you have learned will also affect your learning style. In vocational education, a "deeper" theory is needed as the basis of knowledge and to ensure that someone can understand the actual process to be carried out. For students in vocational schools, this depends on how much theory the students have learned before practice. Of course , They learn. Different. Another definition of theory is about preparing for work or practical tasks in school. With the importance of theoretical mastery at this stage, it is expected that future professional teachers will have sufficient abilities to meet these requirements, but this is also affected by the knowledge they acquire

during university lectures. Kyarizi (2016, p. 6) remind us that, in Vocational education, however, knowledge cannot be viewed in the same way as verbalizing explanations of what a vocation consists instead it should be viewed as being an integration of contextual, theoretical (conceptual, procedural, and propositional), practical, and indigenous everyday knowledge. This is because to be a competent craftsman, a person needs to use all forms of knowledge that relate to his or her vocation in the context in which it is applied. In today's modern world, vocational education has embraced the concept of learner-centered education. This is expected to direct the learning process into an activity that can further explore the abilities of learners in school. In its implementation, the vocational teacher plays a more role as a facilitator in the learning process. For many teachers, moving towards learner centred approaches means they must leave the centre stage to become the creator of a learning environment that gives multiple opportunities for learners to learn. Most of the work is done before facilitating the session, to set the stage for the learning and assessment tasks teachers have developed for the session. Therefore, the purpose of a session plan is to align all learning and assessment activities to the learning outcomes for each lesson, and to ensure that learners achieve said learning outcomes. A session plan is like a road map that helps facilitators to stay on the track. It is a pathway that leads to the set destination (learning outcomes). A session plan is a planning document that gives a facilitator room to deviate, as unplanned events during the session might necessitate this. A facilitator should remain flexible and bear in mind that educating learners is the most important thing, not the plan. Facilitators must avoid situations that will prompt a rush to complete the planned session, as this is counterproductive. With clearly defined learning outcomes, the facilitators can describe what will be achieved in the learning process, and state what the learners can do at the end of the session. Learning outcomes give learners an idea of what the purpose of that session is. It also gives the facilitator practical direction, as it determines the structure of the session, facilitation method, and the mode of assessment to use (Doherty, et. al, 2019, p 13-14). Thus, it can be ascertained that a vocational teacher has a very crucial role in preparing human resources to face the challenges of the 21st century which we know are very diverse and global in nature. The aim of the 21st century facilitation of learning is to support

learners in establishing lifelong learning habits, an ability to learn with technology, the development of knowledge, character, and higher-order skills (such as creativity, critical thinking, communication, collaboration). Implementation of an innovative pedagogical approach will impact on teachers/facilitators, learners, and the learning environment. It is important that the teachers have a clear mental picture of their responsibilities as facilitators. After all, the quality of the TVET education system cannot exceed the quality of its facilitators/teachers (Doherty, *et. al,* 2019, p. 12).

There is obvious evidence that vocational education needs to be carried out in the context of solving practical problems, and high-quality vocational education almost always involves multiple methods. The best vocational education learning is broadly hands-on, practical, experiential, real and with feedback, questioning, application, and reflection, as well as providing theoretical models and explanations when needed, and often at the same time (Lucas et al, 2012, p. 9). In the context of vocational education, the theoretical learning process provided is in the form of actual problem-solving efforts. In the implementation process, the learning methods used vary greatly, and one method cannot be used. In this case, the method is always a combination of several existing methods based on learning objectives. The learning process of vocational education will take the form of direct practice, work experience, practice in the real world and repeated practical demonstrations. This is done to equip students with the ability to follow the predetermined goals. Therefore, vocational teachers are required to have the ability to conduct a good theoretical learning process to provide students with correct information so that these students can practice in accordance with the established procedures. Based on the data obtained from the respondents above, it is stated that the intern teachers have good teaching skills in the theoretical class, with the various methods used they can do their job well, especially in basic vocational subjects. These abilities prove that they have been able to act as vocational teachers in the future. However, the data also shows that some of them still lack theoretical knowledge in certain subjects, as conveyed by the respondent TVS-02 and TVS-04, they stated that for advanced electronics subjects in the refrigeration study program they did not have sufficient competence. This is an important finding to know as a basis for making

the necessary improvements. These shortcomings can be influenced by several variables such as: curriculum, volume of learning at the university, practical activities, and evaluations carried out by the university towards graduates.

Lucas et al (2012, p. 10) explained the list below is indicative of those vocational learning methods which, we believe, have considerable value. They are relatively well understood and used in a range of contexts internationally. The majority are broadly 'learning by doing' or 'experiential', though many combine reflection, feedback, and theory.

- Learning by watching
- Learning by imitating
- Learning by practising ('trial and error')
- Learning through feedback
- Learning through conversation
- Learning by teaching and helping
- Learning by real-world problem-solving
- Learning through enquiry
- Learning by listening, transcribing, and remembering
- Learning by drafting and sketching
- Learning on the fly
- Learning by being coached
- Learning by competing
- Learning through virtual environments
- Learning through simulation and role play
- Learning through games

From the explanation of the learning method from Lucas et al above, we can see that a vocational teacher is faced with complex challenges to be able to carry out his duties. from the list we can make sure that the interaction between teachers and students is very close in the learning process carried out. In its implementation, vocational teachers consciously or not in their daily lives must use these learning methods in practical learning activities, such as demonstrations, learning by doing, imitating, trials, and errors, etc. Therefore, the ability of vocational teachers to carry out practical learning is a characteristic feature and should not be a burden for every

vocational teacher to master it. however, in Indonesia today, the problem of the practical ability of vocational teachers is very complex, this happens even though the teacher has served for many years. Especially for prospective vocational teachers, it has been proven that in general they are not ready to teach in all subjects at SMK, this is a complicated challenge for Indonesia where the level of competence possessed by students at universities should be higher than the level of SMK students. Of course, in terms of the readiness of new graduates, we agree that they are not ready to work as experts in certain fields. However, for a teacher the ability to immediately work according to the demands of the school is a must because if not until when they will be ready and become a professional teacher as expected. Several respondents gave statements about the practical teaching abilities possessed by prospective vocational teachers which in general can be seen that for basic vocational subjects they can carry out the learning process well.

> „[…] the conditions are the same, sir, they immediately teach in the workshop during practical hours, from my observations their abilities are very good sir they can immediately enjoy teaching students during practical hours on my subjects, I convey that because I witnessed […]" (TVS-01)
>
> „[…] demonstration must be done before the students do the practice, the internship students that I guide on average are able to do a practical demonstration to students sir, they understand the stages of practice that must be done so that students understand before doing the practice themselves […]" (TVS-05)
>
> „[…] in machining process, they have good competence for the basic task, such as lathe flat, make multilevel milling, scraping, for that assignment they can make a demonstration to students […]" (TVS-08)
>
> „[…] from my experienced, in my opinion their skills are in accordance with the needs of the school, especially in my subjects, what the internship students have starting from theory and practice is in accordance with the needs of the school […]" (TVS-10)
>
> „[…] for my subjects it is very good, sir. usually at the start of the odd semester, the material provided will start with work bench sir, for that material the internship students have been able to perform tasks as teachers

very well and are able to provide motivation to our students at school […]"
(TVS-02)

From the explanation of the respondents above, we can conclude that prospective vocational teachers already have adequate practical skills in basic vocational subjects. They can carry out their teaching tasks properly according to the demands of the school and can apply good teaching methods according to learning objectives. This becomes an important starting point for these prospective vocational teachers. SMK's need for competent teachers is currently very urgent for every subject, this is the reason that prospective vocational teachers who graduate from university are expected to be able to fill these needs. However, the current fact is that prospective vocational teachers have not been able to answer challenges in advanced subjects, this is a consequence that must be faced that teachers who teach in advanced subjects are only senior teachers, in some cases in study programs for example welding or mechanical maintenance this is difficult because a welding or maintenance teacher must be able to demonstrate practical skills and the fact that to do so, someone is required to have a strong physique and be able to perform physical activities during the practical learning process. According to respondents answer, they stated that in advanced technical subject the intern teachers still need pay attention from the supervisor teachers or in fact is not able to do so.

„[…] for practical skill, I think they must make improvement in advance machining because from what I see they still struggle for make a gear in vertical milling machine, grinding, and advance lathe machining […]"
(TVS-02)

„[…] for the practical class, from my observations for the subject of the cooling system unit or maintenance of the mechanical system it is indeed quite good because it is in accordance with the material in lectures at the university[…]". „[…]but as I said before, sometimes we are dealing with equipment that has an latest electronic system, which is usually a problem for them who make the time to repair in the practice more longer than usual.

So, if the student understands the theory of electronics, he will be a little faster for troubleshooting, so in my opinion sir [...]" (TVS-03)

,,[...] from my experience, usually they need more time to use the equipment, unable to directly use the tool, so when they teaching to students, they are still learning how to use the tool, which resulted in a slightly inhibited learning process[...]". ,,[...]maybe it could be due to differences in the tools and equipment's used at school and at university [...]" (TVS-04)

,,[...] for teaching in practical session, they are not automatic enjoy the activity, they still need time to adjust with tools and materials we have, maybe they have different brand in their workshop in university, but in the end, they can manage all the task as practical teacher under my supervision [...]" (TVS-07)

,,[...] For teaching implementation, because the system is parallel, including practice, so intern student teaches the practice can be in other subjects, for example in plumbing, electricity, or assembly subjects, well, all of it is not only in my lessons, in other subjects also have the same practice[...]". ,,[...]only for class 12 it must be parallel, so each student at the school has a different problem, for example in the plumbing subject, students can teach assignments during practice hours, even though it is not their field, so the teaching performance is not optimal[...]". ,,[...]so, the intern students are not just an assistant but acts as a normal teacher like a regular teacher [...]" (TVS-09)

,,[...] from my experience, when they conduct practical session, they have good skill to supervise students in workshop, but for advance task is far away, they do not ready Sir, I think maybe they do not have enough practical time in university [...],, (TVS-04)

Considering that the purpose of vocational education is to prepare someone to master a skill according to the demands of a standard or occupation, the practical learning process is a major factor in the TVET process. The overarching goal of vocational education is, we believe, the development of working competence in a chosen vocational area. Put another way, vocational education is about enabling

people to learn how to do things to a standard set by experts from the occupation into which they are progressing. The primary outcome of vocational education is expertise – being able to do skilful things of a kind and in an area of work that is quite clearly specified and understood. This distinguishes vocational education from more academic forms of education where the valued goal (as defined de facto by most forms of assessment) is to be able to write and talk about something; to be able to explain, critique, theorise and justify (Lucas et al, 2012, p. 37). Wrenn and Wrenn (2009, p. 258) described that educator in professional or service-related fields desire their students not only to learn theory and understand why theories are important but also to learn how to apply the theoretical frameworks in practice. Too often we hear anecdotal accounts of students in internships who are unable to make this transition from theory to practice with confidence and effectiveness. Perhaps the difficulty in making the transition from theory to practice arises, at least in part, from a failure of the teacher to integrate both theory and practice into the same course in the curriculum in ways that are relevant and meaningful to the student. Such integration helps students to more closely associate the practical value of learning theoretical concepts.

6.2 Factors Influence of Practical Skills Deficit of Prospective Mechanical Engineering Teachers

This sub-chapter will discuss what factors influence of practical skills deficit of prospective vocational teacher, based on the data that has been analysed. Based on the main categories that are generated from the inductive category analysis process, below will be discussed the TOP 3 main categories which are a factor in the occurrence of practical skills deficits of prospective teachers.

6.2.1 Main Category Learning Strategy

For achieving the target set to prepare students for become a TVET Teacher, lecturer at university need proper lesson plan to conduct an effective classroom whether in theory or practical learning process. In this context, Doherty, et. al, 2019,

p. 13 described the lesson plan for innovative pedagogy approach in a 21st century and in an outcome-based education will focus on two main aspects :

- The session plan must be learner centred, inclusive and learner friendly
- The session plan must embed whenever possible, 21st century skills

For many teachers, moving towards learner centred approaches means they must leave the centre stage to become the creator of a learning environment that gives multiple opportunities for learners to learn. Most of the work is done before facilitating the session, to set the stage for the learning and assessment tasks teachers have developed for the session. Therefore, the purpose of a session plan is to align all learning and assessment activities to the learning outcomes for each lesson, and to ensure that learners achieve said learning outcomes.
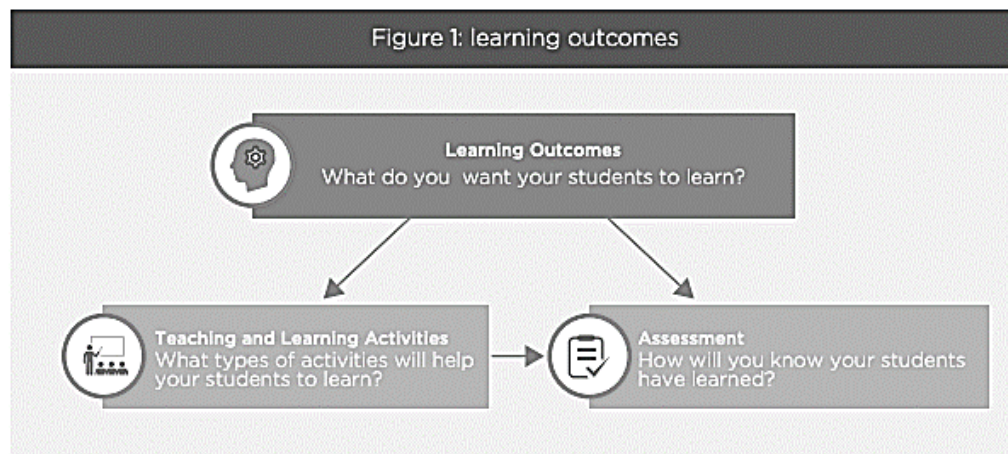

Figure 6.1 Learning Out Come

Source: Doherty, *et. al*, 2019, p. 14

From the explanation above, it can be said that the condition of the learning process must be student-centered with practical activities that provide flexibility to carry out creativity, innovation and strong thinking analysis supported by lecturers who become facilitators in the process.

According to some respondents, practical learning carried out at the TVET Faculty of the University of Pendidikan Indonesia (UPI) is student-centered, providing flexibility in practice activity and the opportunity to use tools and materials that are not limited by schedules. But due to lack of funding lecturers must reconsider the assignment.

„[…] Ok, it will be like this, Sir. after I develop the lesson plan, Students who contract my course are expected to have several competencies related to the subject, even though there is no competency test[…]". „[…]Well, I arranged a practical plan including a schedule, then I propose to study program management for the financing[…]". „[…]After I get the funding for the practical lesson, the schedule will be changed to adjust with financing we have […]" (UL 4).

From the respondent's (UL 4) explanation above, it can be concluded that the lecturer has tried to plan learning according to the target set, but in implementation it cannot be done ideally due to the limited source of funds to carry out practical learning. The learning process carried out in TVET faculty must refer to the expected graduate profile or teacher standard set by government as conveyed by Spottl, 2009, It is necessary to develop standards for teacher training which describe the required competencies to be acquired during the study course. The study course must be linked to practical training phases. The teacher training must be shaped in a competency-oriented way. To reliably coordinate this requirement, the performance of the partner institutes participating in teacher training must be fine-tuned.

To achieve the goal of TVET Faculty, which is to produce competent vocational teachers, it turns out that the learning process carried out has not yet referred to the achievement of competencies that must be possessed as evidenced by the results of the interviews, all respondents stated that the portion of the theory class is more than the practical class. This is of course contrary to the characteristics of vocational education which has a character in the mastery of skill practice.

„[…] in our faculty, the comparison between theory and practice may vary among subjects, especially in my subject the comparison was 60 % theory and 40 % practice, this in line with the curriculum we have currently […]" (UL 5).

„[…] yes, for clearness, I must look at the curriculum document first. From what I know, the comparison of theory and practice is approximately 30

percent practice and 70 percent theory; for more details, we must look at the curriculum, Sir […]" (UL 4).

The link between theory and praxis has often been identified as a possible weakness in the traditional system of TVET Teacher Training (Nielson 2002). With the proportion of learning as described by (UL 4 and UL 5), we can conclude that students will find it difficult to achieve the target of completing practical assignments given by the lecturer because the time they have is not ideal for doing all the tasks given. In daily practical activities, respondents stated that although to achieve the set competency targets, they practiced using the Competency Based Training concept which was effective in measuring the mastery of targeted skills in the curriculum.

> *„[…] So, we conceptually conducting competency-based training, so we practice competence-based in practical activity in our workshop, which refers to national occupation standard (SKKNI) […]" (UL 1).*
>
> *„[…] Oh, the concept does not change, sir, it is still CBT. Still, the achievement of competency is as much as possible, so I will give all lessons as shown in the lesson plan[…]". „[…]For the practical class at the end of the lecture, the target of the assignment is not 3G anymore, for example, because of limited time and funding, and this is no control from anyone, this is the real condition, sir […]" (UL 4).*
>
> *„[…] in the refrigeration and air conditioning, the learning process was focused on competency achievement related to the job sheet[…]". „[…]In other words, yes, we still using CBT as usual, but for some subjects, we also conduct work-based learning because students will learn in the industry, but not many subjects, just view of them […]" (UL 5).*
>
> *„[…] the concept of our learning based on the existing curriculum is CBT, we blend with experimental study, but the theory remains at the beginning of the next meeting, it has already been given in the form of job sheet they had to complete at the end of that lecture, overall, 16 times the meeting […]" (UL 8).*

CBT is a structured training and assessment approach that allows individuals to acquire the skills and knowledge to perform simple or complex tasks to a specified standard. CBT is focused on:

(1) the performance of tasks and duties by an individual.

(2) the conditions in which they are to perform these tasks and duties; and

(3) the standard to which they are to perform.

CBT is an outcome-based learning system for developing curricula. Training and assessment are centred around learners achieving certain competencies according to clearly defined criteria and undertaken within workplace-like conditions. CBT is, therefore, a form of training that is specifically focused on achieving competence. Training is typically divided into small units that are dedicated to the mastery of a specific competency and articulated together into more complex structures. Once students can demonstrate the mastery of a given competency, they then proceed to the next unit. Instead, CBT attempts to be market-relevant, since it is based on information about the needs of the labour market and, in return, signals to employers the available skills and employability of jobseekers (ILO, 2020, p. 13).

From the results of the interviews obtained and analyse the theoretical of CBT, the application of the CBT concept in practical activities in workshops has not fulfilled the basic principles of the CBT concept which must refer to competencies that must be achieved gradually. In fact, what TVET Faculty UPI did in general was still referring to courses. this is not in line with the ILO, 2020, statement that, CBT is replacing traditional training and learning methods, which are often undertaken within a course or subject. These have tended to mostly focus on knowledge without the mastery of real-life industry skills or any consideration for labour market performance (ILO, 2020, p. 12). The quality of teacher training exerts a major influence on the quality of the young persons to be trained and on the sound development of democratic societies. It is therefore recommended to implement the teacher training at universities by all means. The teacher profiles must not be determined to narrowly. They must not only concentrate on instruction but must focus on the development of schools as a whole and must concentrate on the industrial challenges as contents of training (Spottl, 2009). From interview

respondent described that the implementation of teaching and learning activity at TVET Faculty of Universitas Pendidikan Indonesia (UPI) so far strived to always connect learning with industry characteristics, in practical learning activities, the learning target was based on occupation in industry related.

> *,,[…] we produce our automotive teacher; they should educate students to become a professional mechanic[…]". ,,[…]After they become a professional mechanic, they should be able to transfer their knowledge[…]". ,,[…]So, we give the practice so that students can reach the senior mechanical level, understand the materials, etc., then be assisted by teachers […]" (UL 1).*

> *,,[…] to prepare our students as competence teacher in vocational schools, the learning process we conducted were based on school needs as shown in certification scheme level 2 and 3, in the refrigeration and air conditioning field we will prepare them as a technician who able to repair and maintain the air conditioning unit in a house or building […]" (UL 5).*

> *,,[…] we prepare them to become welding teachers, so our students will receive knowledge on how to become professional welder in daily practice[…]". ,,[…]Regarding target, in our curriculum, they must achieve the 3G (vertical) position, then they also learn pedagogical knowledge […]" (UL 8).*

> *,,[…] in our department, we train students as professional mechanics in maintenance or become professional metal cutters, so based on our curriculum, students will practice how to conduct maintenance and repair as well as metal cutting practice in lathe machine and CNC machine […]" (UL 9).*

6.2.2 Main Category Practical Learning Process

There is a growing interest in practice-based learning in countries with both advanced and developing economies. Much of this interest is directed towards augmenting students' learning within vocational or higher education programmes of initial occupational preparation or those for professional development (i.e., further development of occupational knowledge across working life). Increasingly,

educational programmes organised by universities, technical colleges, and professional bodies, are often either premised upon or partially based within the learner's occupational practice. Hence, at this time, there is a wide and growing acceptance that the experiences provided in practice settings, usually workplaces or work settings, are essential for developing the knowledge required to effectively practice occupations (Billett, 2010, p. 1). In this context, practical learning process conducted at TVET Faculty of UPI was implemented with some cooperation with industry to ensure the outcome were in line with industry development and meet the demands regarding the occupation in industry, but this activity was done personal by lecturer not as a system from university.

> „[…] from 2019, we have a partnership for practical learning in CNC machining course with SMKN 2 and SMKN 6. students who contract CNC machining course must take an apprentice program in those SMK sir[…]". „[…]Also, in some learning processes in school, they became an assistant teacher, sir […]" (UL 2).
>
> „[…] there is some cooperation with the industries, usually from our alumni, we have a partnership with Robert Bosch for an advanced course in the fuel injection and common rail systems[…]". „[…]Also, we got some tools from the industry as a donation […]" (UL 1).
>
> „[…] currently, I am active in one of the small metal cutting industries. We can assist student I teach who relates to machining techniques and their practice in the mechanical engineering workshop[…]". „[…]I offer them to join the internship program in my company, and the internship is not six months, sir but one year because they can later obtain a job certificate for a one-year internship […]" (UL 2).
>
> „[…] I think cooperation with industry is essential, sir. Fort that reason, we have been using alumni networks to cooperate with the industrial side, so there are not too many obstacles in our department[…]". „[…]We already collaborate with industries related to fieldwork practices and labor absorption […]" (UL 3).
>
> „[…] we have several cooperation with refrigeration and air conditioning industry to conduct some practical learning process because we have

alumni worked in related industry, it helps us to bring our students to industrial experience [...]" (UL 5).

In practical learning process vocational trainer should carry out a demonstration to transfer skill to students, in this context, Doherty et. al, 2019, p. 23-24 described that a teaching method used to communicate a skill with the aid of audio, visuals, or audio-visuals such as flip charts, posters, power point slides, real objects [e.g. making a dovetail joint, folding a napkin in bishop mitre shape], video clips, or through role / life display [e.g. demonstrating how to greet a person at a front desk, how to stand / speak when giving a presentation], etc. A demonstration session is the process of facilitating the learning of a skills in a step-by-step process. This may involve showing by reason or proof, explaining, or making clear examples or experiments. Demonstration method improves the understanding of complex skills and principles because the learners can pay attention to and follow along with the learning process. This method need not be facilitator demonstration, it can be invited expert, can be learners in experiential learning cycle; 'demonstration' can also – and often better – be 'video demonstration' following the demonstration on a video clip, visible to all learners. It can be stopped, replayed, allows close ups etc. Brief description of Demonstration method/guideline:

Step one :

Position the students and training aids properly. Make sure that everyone has an unobstructed view. Show and explain the operations in step-by-step order. Say what you are doing as you perform the demonstration either real or video demonstration. Ensure students understand each step before proceeding to the next step. Repeat difficult operations. Pause briefly after each operation to observe reactions and to check for understanding. Ask questions during the demonstration that require the students to recall.

Step two :

Generally, there is a need for the inclusion of one or more repetition steps between the demonstration step and the performance step.

Step three :

The third stage is the step in which the students practice under supervision until they have attained the required proficiency. During this step, they apply what they have previously learned because of the demonstrations. This method is best used when:

- Teaching technique, procedure, or operation to a small group of learners.
- There is need to develop student ability to operate equipment or acquire physical skills. Topics like how to "make pastry', catering, electrical or computer craft subjects can be taught using this method.

Based on explanation above, practical learning conducted was held with the demonstration and assignment method with several job sheet given to students, all respondents state that in practical learning process they provide job sheet for students which is become an assignment must fulfil by students to pass the course.

„[…] so initially, they are just observations and notes at the beginning of practice, then for the next meeting they receive job sheet they must be doing, suppose they should measure directly on the course […]" (UL 3).

The demonstration method carries out by lecturer to guiding the step by step of the assignments before students practice independently practice based on job sheet, in implementation the assignment was based on personal assignment, but in several courses that was impossible to give the personal assignment due to lack of tools and material in workshop. For that reason, lecturer given the assignment as group in maximum 3 person but the evaluation still carry out in personal basis.

„[…] The assignment is in person, but the implementation was in a group; although one engine stand was for 3 or 4 students, the job was in person[…]". „[…}So, in the process of practice, all those students should be able to overhaul the engine[…]". „[…]On the engine tune-up practice, there are also practices in groups, but eventually, all those students should be able to tune up; that is how we get around the limitations of tools and materials […]" (UL 1).

„[…] it is mostly personal tasks, sir. As in my courses, all are just individual assignments, because if I give them group assignments, it hard to know which ones students have a good work or not sir […]" (UL 2).

„[…] the practical learning assignments are usually personal for equipment or machines that have sufficient ratio, sir[…]". „[…]Still, once there is a ratio of machines that lack the example of gear making, so we give assignment one job sheet for two students, we try no more than two people, so we prioritize personal assignments, sir […]" (UL 4).

„[…] the student's assignment always a personal project, because we have enough number of tools and machines as required on the job sheet, in the process the achievement of the assignment was varied among students it depends on their motivation and willing to learn […]" (UL 5).

„[…] the assignment is independent (personal) sir, It depends on the job given, if the job is made to work together with the group, it is made in a group […]" (UL 6).

„[…] actually, a job sheet is personally contents of each person just as they must create their programs in their program style[…]". „[…]Because differently some like absolute, instrumental, there is also a cutting cycle there that is one way, etc[…]". „[…]That is all; we monitor that matters the product according to the image sir, which remains using the customs of CNC program making […]" (UL 8).

„[…] the assignment was divided into two kinds, sir. There is a group job sheet at the end of the semester[…]". „[…]Still, at the beginning of practical learning, I give them a personal assignment; at the end of the semester, they present a verbal and practicum directly to solve one case/problem in pneumatic technology[…]". „[…]So, I hope that the student is mastering the competencies as curriculum demands […]" (UL 7).

Based on data obtained from respondents, we can see that the activity of practical learning process has been in line with the proper theory about how the demonstration method conducted properly, from the respondents explanation the demonstrations method with job sheet for observe the assignment was conducted effectively to achieve the skills target set. although there are still problems with assignments that cannot refer to personal assignments because the comparison between students and equipment is not ideal in some courses.

„[…] In our job sheet, there is a target that must be finished until complete. We only have training units for 2 and 3 axes; the only constraint is now in our CNC machine; It is still Austrian aid from 1992, so it is already too old, with that kind of problem[…]". „[…]Our job sheet is reduced, regularly we have eight job sheets, but now it is just four job sheets due to limit the CNC machine […]" (UL 8).

To measure the success of the practical learning process that has been carried out in the form of practical assignments to students according to the targets that have been prepared, the lecturer needs to carry out a measurement or assessment of the competencies that students have obtained as a whole and comprehensively. Assessment of learning characterises how we may traditionally view assessment. It involves making judgements about students' summative achievement for purposes of selection and certification, and it also acts as a focus for institutional accountability and quality assurance – for example, the number of 'good' degrees awarded is used as a key variable in university league tables. On the other hand, assessment for learning is formative and diagnostic. It provides information about student achievement which allows teaching and learning activities to be changed in response to the needs of the learner and recognises the huge benefit that feedback can have on learning (Black and Wiliam 1998, p. 32). In this context, Abrahams and Reiss (2015, p. 40) describe about summative and formative assessment :

- Summative assessment: Assessment of the learning, where the marks are for a terminal test or examination.
- Formative assessment: Assessment for learning, where students are given feedback from the teacher during the teaching, they receive to progress as opposed to being given a final assessment of their learning.

Regarding evaluation and assessment activities, respondents explained what they did to assess the achievement of student practical competencies in the form of comprehensive assessments starting from daily assignments, attitudes in the learning process, midterm exams and final semester exams.

„[…] the evaluation made to the student is made holistic. It consists of attendance, Middle semester test (UTS), Final semester theory test (UAS), presentation, and practice, and the attendance must be 80% sir[…]". „[…]At the end of that semester, we usually will do a practice test, same with UAS, to gain student final grade […]" (UL 3).

„[…] there is a daily observation, namely the assignments evaluation given to each student and then combined with the final scores[…]". „[…]Sir, the practice exam is for psychomotor, sir[…]". „[…]We also see students working attitude in daily practical learning takes place[…]". „[…]For cognitive, there is a written test in the form of a final semester examination […]" (UL 4).

„[…] students will have final grades based on daily activity, middle semester test, final presentation, and practical test at the end of semester […]" (UL 5).

„[…] What becomes the consideration for student grade in that practicum is the process, even though we do not do smoother observation sheets every meeting[…]". „[…]Still, we understand every student what they like. We see them daily at practice; then the second part is discipline, then the next part is a cognitive test, also a psychomotor test conducted with the performance test. We performed at the end of the running semester […]" (UL 1).

The evaluation carried out so far is still in the form of fulfilment to give students a grade to pass a course. Until now, the evaluation has not led to an objective measurement of the quality of learning outcomes. Learning outcomes are used as one way of driving efficiencies and permitting a move away from time-based programmes and education systems. Efficiencies could include exemptions from instruction in parts of programmes, and increased institutional accountability based on outputs (defined as learning outcomes) of educational processes (CEDEFOP, 2011, p. 11). Competence-based qualifications consider the influence of the learning (or working) context when learning outcomes are defined and assessed. This context has a strong influence on the range of learning outcomes that

are considered important, the interaction between them, the way the learner learns, how the outcomes are assessed and most importantly, the value attached to qualifications in the field (CEDEFOP, 2011, p. 12). To measure whether learning outcomes are in accordance with applicable standards, it is necessary to carry out assessment and certification from a third party, this is important to do so that the efficiency and effectiveness of the learning process that has been carried out can be measured by looking at the results of the assessment process by a third party.

> *„[…] Yes, yesterday we had a competency test for students, we have cooperation with APTO, an association of automotive engineering professions, this competency test was for tune-up levels, we had time to use that and given certificates from APTO […]" (UL 1).*
>
> *„[…] for competency test, we do not have yet, sir, because I was the new LSP chairman founded in 2018 by the Rector[…]". „[…]Currently, we are still in the process of getting a license from BNSP as an assessment Institution[…]". „[…]But later, suppose the license has been granted, then we can conduct the competency test. […]" (UL 2).*
>
> *„[…] we are currently unable to pursue the assessment test because it has to do with inadequate financing[…]". „[…]We were trying to take the competence test from National Body for professional certification (BNSP)[…]". „[…]Still, it turns out that the cost is too high for our students, so the department cannot afford to do the competence test process […]" (UL 3).*
>
> *„[…] so far, for those refrigeration students, no one has ever done a competence test with a third-party, unless it is already an alumnus doing their certification because they could use their expenses […]" (UL 3).*
>
> *„[…] Well, for third-party certification, until now, we have not implemented it[…]". „[…]Now we are currently trying to become an LSP (assessment institution), sir[…]". „[…]Now it is forming a process to be submitted to BNSP to come carrying out competency tests under BNSP regulation[…]". „[…]Still, there are currently insufficient funds to do this, but many students also carry out their independent competency tests […]" (UL 4).*

„[…] of course, we want an official assessment from third parties. Still, we cannot do so due to limited funding, commonly we just conduct tests by inviting the assessor from industry such as MITSUBISHI, LG, and other industry related […]" (UL 5).

From data obtained, only in automotive major conducted the third-party certification because the lecturer has willing to do so, whether the other major not to do so due to lack of funding. We can see that currently there are no rules or policy from university to conduct the thirds party certification. This situation causes learning outcomes not to be accurately described and the quality of graduates is not measured objectively.

6.2.3 Main Category Curriculum Development

To produce graduates who become vocational teachers with capability and competence according to the needs of the school, an appropriate curriculum is needed in its implementation. Curriculum development in TVET Teacher education and training should be conduct in sustainability manner, in this context, Yunos, Sern and Hamdan (2019, p. 49) states that the purpose of a Teacher Education programme is to produce quality teachers, especially teachers that can perform the task of teaching effectively and deliver the purpose of the National Education Philosophy, consequently leading to a sustainable TVET Teacher Education programme. The curriculum must be able to react with the changes took place in the workplace. TVET Teacher Education programmes require different criteria than general Teacher Education programme. More particularly, the highlighted these specific criteria for TVET Teacher Education Programme as follows (Yunos, Sern and Hamdan, 2019, p. 51) :

- specialization.
- work-based design.
- dynamic.
- interactive teaching and learning, and
- international syllabus.

„[…] for curriculum development, every year, there is always a development process according to the development of the industry[…]". „[…]At the university, there is a scheduled once in 5 years to revise the curriculum[…]". „[…]So, every year, there is also a changed curriculum. The revision of this curriculum is based on inputs, one of which is from industry, specifically the automotive sector or users[…]". „[…]This undergraduate program aims to generate prospective teachers, so we are accepting input from the vocational school of its users, from industry, and vocational training center […]" (UL 1).

„[…] regarding curriculum development in mechanical engineering education based on schedule at university is every five years[…]". „[…]This year, we also undergo curriculum development even if it has not been five years, but whose nature is incidental […]" (UL 3).

„[…] regularly the curriculum development in UPI set up once in 5 years[…]". „[…]Still, in implementation, we also made a change yearly when we feel that the curriculum must adjust to industry development or new standard in expertise […]" (UL 5).

„[…] every year, we conduct the curriculum evaluation for adjusting to a new standard or industry development[…]". „[…]From evaluation, we will decide that we need to develop a new approach or still using the current curriculum […]" (UL 9).

Respondent stated that, curriculum development is carried out regularly, either a fixed schedule from the university every 5 years or an evaluation every year to make the necessary adjustments related to changes or developments in the industrial world. In term of curriculum development, Spöttl (2007) in his working paper 'Standards for TVET Teacher Training' and the TT-TVET Consortium (2005) cited by Haloader et al (2017, p. 2-3) present general standards for TVET teacher education covering six areas of development:

1. Standards for lecturers'/teacher trainers' activities (in TVET teacher education) as support for teachers' practice in TVET,

2. Standards for supporting students (trainee teachers) and their learning processes within TVET teacher education,

3. Standards for evaluation (of curricula) and assessment (of students' achievements),

4. Standards for developing curricula and learning contents,

5. Standards for developing methods for instruction and training, and

6. Standards for developing the organizational frameworks for learning environments.

The standards mentioned above must be a reference in the implementation of curriculum development carried out at TVET Faculty so that the learning process can be measured both in terms of process and learning outcomes.

In the context of Indonesia TVET Teacher training, Indonesia has developed National Competency Standards for teachers and lecturer through act number 14 of 2005, this act become the basis for development of Initial TVET teacher curricula in university.

The act states that Teachers is educator in a school both public and private schools who can educate based on the formal education background that has been taken. The teacher is in charge of educating, teaching, guiding, directing, training, evaluating, and evaluating students' education in early childhood education, through formal education, basic education and secondary education.

specially for vocational teachers, the emphasis on professional competence is the main issue discussed and becomes the object of development to ensure the quality of learning at SMK. As described in act number 14 of 20015 : Professional competence is the ability possessed by the teacher about mastering learning material widely and deeply, it is one of the things that allows teachers to be able to guide students to meet the standards of competence and national standards of education. The following components are in professional competence.

- Mastering material, structure, concepts, and scholarly mindsets that support the lessons learned.

- Mastering the competency standards and basic competencies of subjects or fields of development that are capable of.

- Develop learning materials on an ongoing basis by carrying out reflective actions.
- Using Information Technology Communication to communicate and develop themselves.

Here is the comparison of the study programme between university and secondary vocational school (SMK) at mechanical engineering department of TVET Faculty of Universitas Pendidikan Indonesia.
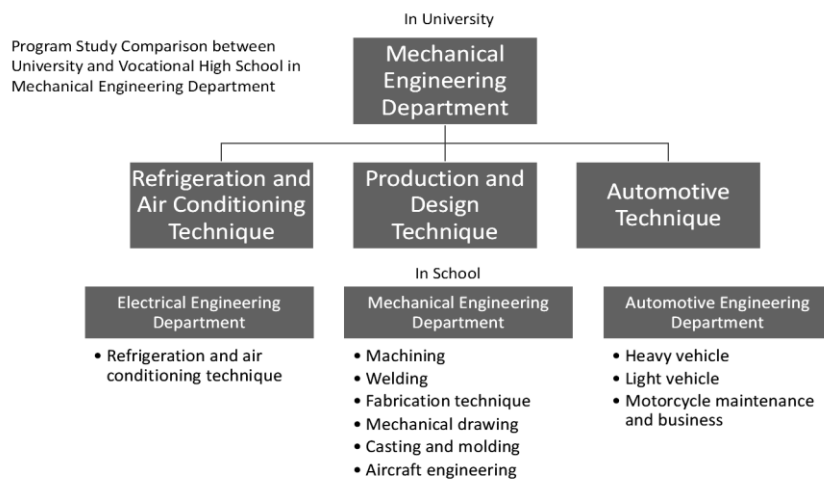

Figure 6.2 Study Program Comparison between TVET faculty and SMK

The curriculum in the vocational education program contains 144 – 150 credits, for example, below is the table of the curriculum for Automotive Education Engineering program in Universitas Pendidikan Indonesia (UPI):

Table 6.1 Example of Vocational Teacher Training Curriculum

KIND OF SUBJECT	SEMESTER CREDIT UNIT (SKS)	EXPLANATION	INFORMATION
General Subject	14	COMPULSORY	General Subject
Educational Basic Subject	12	COMPULSORY	Educational/didactic subjects
Internship Program (PPL)	12	COMPULSORY	Teaching Practice in Vocational

			Secondary Schools (SMK)
Professional Expertise Subject	4	COMPULSORY	vocational/technical subjects
Expertise Subject	86	COMPULSORY	vocational/technical subjects
Deepening Expansion Subject	16	Students are only required to choose 16 credits from the 40 credits offered	vocational/technical subjects
Thesis (Final Project)	6	COMPULSORY	Final thesis
TOTAL	150		

Note: processed from http://mesin.upi.edu/content/page/Kurikulum

Below is another example from the vocational teacher training undergraduate program every semester:

Table 6.2 The Distribution of Subjects in The Teacher Education Curriculum
(Electrical Engineering Education)

1 semester	2 semester	3 semester	4 semester	5 semester	6 semester	7 semester	8 semester
General Subject 30%	General Subject 20%	General Subject 10%	General Subject 0%	General Subject 10%	General Subject 20%	General Subject 0%	General Subject 0%
Educational /didactic subjects 10%	Educational /didactic subjects 20%	Educational /didactic subjects 15%	Educational /didactic subjects 25%	Educational /didactic subjects 10%	Educational /didactic subjects 25%	Educational /didactic subjects 22%	Educational /didactic subjects 100%
vocational/ technical subjects 60%	vocational/ technical subjects 60%	vocational/ technical subjects 75%	vocational/ technical subjects 75%	vocational/ technical subjects 80%	vocational/ technical subjects 55%	vocational/ technical subjects 68%	vocational/ technical subjects 0%
					Internship in SMK (PPL)	Thesis 10%	Thesis Defence
Total SKS **18**			**98**			**30**	

Source: Kustija, 2010 cited by Kurnia, 2013, p. 29

From the table and figure above, we can see that the curriculum developed at TVET faculty of UPI were different with study programme at secondary

vocational school (SMK), which is make the contain of the subjects at TVET faculty would be not covered all the competency unit which is contained in subjects at SMK. Only refrigeration and air conditioning study program have same study program with SMK, meanwhile, production and design study program at UPI must cover 6 study programs at SMK, and automotive study program must cover 3 study programs at SMK. To develop a curriculum that suits school needs, in its implementation, curriculum development is compiled by lecturers by involving the SMK as an input provider for curriculum content.

> „[…] in the process, all lecturers will involve in curriculum development as faculty asked[…]”. „[…]We will invite all stakeholders related to industry, vocational school principals, and other vocational education institutions […]” (UL 5).
>
> „[…] The curriculum we form in my department refers to the study program at vocational schools (SMK)[…]”. „[…] Regularly, we invite all stakeholders to discuss curriculum development for a better result. We will ask all developers, "what would you like to be a teacher in SMK?" […]” (UL 9).

In principle, the curriculum prepares vocational teachers who have pedagogical competences and technical competences that are in accordance with the needs of the school, therefore curriculum development is carried out, its content also refers to the same standards referred to by SMK.

> „[…] so, first in the curriculum drafting, we refer to competence that the vocational schools (SMK) students should master[…]”. „[…]The mechanical engineering program is split into six majors: machinery, welding, fabrication, casting techniques, aircraft technique, and engineering drawing[…]”. „[…]The curriculum we form in my faculty refers to the study program at SMK, among which we take weight in the later existence of students who choose machinery, casting, or welding techniques, and engineering drawing […]” (UL 2).
>
> „[…] actually, for the pneumatic and hydraulic, it was me who took responsibility for curriculum development[…]”. „[…]Usually, we will

connect the curriculum with the National Occupation Standard (SKKNI) and the development of industry and search through the internet its materials […]" (UL 7).

„[…] So, we are referring to vocational school (SMK) needs because our students are oriented to be SMK teachers, the second we also believe the subjects in SMK refer to SKKNI sir[…]". „[…]The courses we put together starting from 2018 are referred to National occupation standard (SKKNI) sir […]" (UL 2).

From the explanation above we can see that in its implementation, referring to the differences regarding the characteristics of the study program and the existing curriculum structure, it can be ascertained that the practical skills of graduates produced by UPI cannot directly meet the needs of schools because the curriculum structure does not provide much practical experience according to the needs of the SMK. In this context, Axmann et al, 2015 explain in "Four pillars and twelve key elements of teacher training system", he described in Pillar one that, effective teacher training systems are those that have a meaningful structure which includes different distinct stages of teacher preparation, those that train recruits according to good practice and in ways coherent with local contexts.

7. Conclusion and recommendation

7.1 Research Summary

Today, we are witnessing an accelerated socio-economic revolution in all aspects of Indonesian life. This new situation requires increased productivity in all economic sectors. This can only be achieved through a skilled labor force because with the changes in the economic and occupational structure, and the labor force can flexibly acquire new skills and abilities to engage in new jobs. Therefore, vocational, and technical education and training in Indonesia need to adjust its plans and operations. Direction to better adapt to the new economic and technological environment. Teachers and trainers will be the cornerstone of the whole process. Unless we rebuild their capabilities, we will not be able to realize this new aspiration. The research is divided into seven chapters, and the main purpose is to investigate the skills deficit and its factors influence of prospective mechanical engineering teachers in west java by exploring practical learning activities in universities and teaching internship activities in schools to find out the fact that skills insufficiency may occur. Researchers believe that one of the weaknesses of the total output of vocational and technical education and training in Indonesia is the axis of teachers and trainers. This research will focus on initial teacher training.

Chapter 1 includes the background, problem statement, research questions, objective, limitation, and research outcomes.

Chapter 2 describes and shows some of the characteristics of the education system in Indonesia. Various special characteristics can be observed in this chapter. The education ladder is stable in the 6-3-3 system to date. According to the current education system, the general and vocational education pathways have their respective independent pathways even though, in fact between these systems can cross each other in terms of participation, a graduate from a general school (SMA) can take vocational higher education as well as a graduate from a secondary vocational school (SMK) can attend education on the academic track. Currently, the ministry of education and culture has a Directorate General of vocational education, which is responsible for implementing strengthening and development programs in vocational education at all levels of education. Specifically for the

initial TVET teacher training, until now, it is still under the authority of the Directorate General of Higher Education through universities in the faculty of vocational technology education.

Chapter 3 is the theoretical background deals with the international concepts concerning the study orientations. The term TVET Teacher type, a characteristic as highly objective of professionalism, has been explained; also, the concept of curriculum developments in initial teacher training presented. All other components contribute to raising the standard of initial TVET teacher training, like a practical learning process, competency, and capability of TVET Teacher, Teaching internship at school in order to give the real experience to prospective TVET Teacher in Indonesia.

Chapter 4 describes the methodological approach where qualitative (interviews) data are applied to achieve suitable information about the situation of initial TVET teacher training in Indonesia. It begins with the research design, through to the research plan. Emphasis is on the data sources, description of the sample target, and method of analysis adopted for the data collected.

Chapter 5 is a result finding, where data is obtained from the analysis carried out by the inductive category development method referring to the theory of Philip Mayring. In this chapter, the results of interviews with analysis methods are presented, which are described step by step in producing the main categories based on the research questions.

Chapter 6 is a results discussion, where data is obtained from the analysis carried out by the inductive category development method referring to the theory of Philip Mayring. A critical discussion is carried out to answer the research questions that have been determined and to present the results of the discussion as a result of the research process.

7.2 Research Conclusions

The conclusions in this study are compiled based on the research objectives, data analysis, description, and discussion of research results. Some of the conclusions that can be conveyed are as follows:

- The curriculum applicable in the vocational technology education faculty still has a gap with the needs in the SMK curriculum (miss match).

- There are differences in views in determining study programs between tertiary institutions and secondary vocational schools, resulting in prospective teachers not being able to directly choose the areas of expertise they will pursue when they become teachers because the knowledge gained in tertiary institutions is not specific to the existing study programs at SMK. Especially in production and engineering design study programs.

- The education of prospective vocational teachers in tertiary institutions is still not able to answer the demands of vocational schools for prospective teachers who have professional competence in accordance with the demands of the curriculum in SMK.

- The developed curriculum in TVET faculty, even though it has involved industry and schools, has not answered the need because the comparison of academic subjects is still more than that of expertise courses.

- The learning process carried out at TVET faculty is still less than ideal if it is seen from the comparison between the number of theoretical hours and practical hours. In interviews, it was found that the number of theoretical hours ranged from 60-70% compared to 30-40% for practice.

- The practical learning process carried out in the TVET faculty is the most important thing in preparing the professional competence of vocational teachers according to predetermined standards. In its implementation, it has been carried out as much as possible with several limitations, such as hours of practice that are not in accordance with the demands of the worksheet, the amount of equipment and materials is not balanced, and funding is not in accordance with the needs.

- The practical learning process that is carried out refers to the concepts that are in accordance with the characteristics of vocational education, which is oriented towards mastering competencies even though it has not been able to reach the advanced level as expected.

- Assignments given to students are based on funding conditions, equipment, and available practical materials. This is not ideal because assignments must

be based on worksheets that have been prepared based on learning objectives according to the demands of the curriculum.

- In overcoming limitations in the learning process, the lecturers have made every effort to carry out practical learning to the fullest, such as: collaborating with industry for practicum activities, involving alumni to help fulfil practicum tools and materials, providing additional time outside of regular time so that students have sufficient time to complete all given practical assignments.

- The management of the faculty does not objectively evaluate the success of the practical learning process carried out by the lecturers to measure the extent to which the effectiveness and efficiency of practicum activities have been carried out.

- Evaluation of competency attainment during practical learning is only done to provide final grades to students. There is no objective measurement of competency mastery that has been carried out systematically by the University.

- Several lecturers conducted third-party assessment and certification through their respective personal policies to ensure the quality of the related students.

- The implementation of the teaching apprenticeship shows that prospective teachers can teach only up to grade 11 at SMK. They do not yet have the confidence to teach in grade 12 because the skills required have not been fully mastered by them.

- Prospective teachers have good pedagogical skills in the learning process. They also have excellent communication skills with vocational students, colleagues, and school management.

- Prospective vocational teachers who are graduates of universities have not been measured objectively in terms of mastery of practical skills due to the absence of a systematic competency certification process.

7.3 Further Development of TVET Teacher Education and Training in Indonesia

7.3.1 Recommendations For Policy Maker

- There must be an adjustment to the current study program in universities, especially for vocational teacher candidate education. The study program should refer to the competency of expertise or majors applicable to SMK so that graduates focus on becoming vocational teachers and no longer looking to other careers as non-teachers.

- Regarding curriculum development in TVET faculty, there must be a change in perspective in the development pattern. The curriculum should refer to the minimum requirements that exist in the SMK curriculum, so that prospective teachers get sufficient provisions when they teach SMK students.

- The comparison between academic/general courses and vocational expertise courses should be changed to more expertise courses than general/academic courses, so those prospective teachers are provided with sufficient practical skills according to the needs of SMK.

- The process of preparing for practical learning must be radically changed, especially regarding funding which must refer to competency mastery. The provision of practical tools and materials should be provided based on the number of assignments to be given.

- Learning hours must be given more in practical learning so that students have sufficient time to carry out practical assignments given by the lecturer.

- Equipment revitalization must be carried out in accordance with industrial developments so that the learning process can adjust to current conditions, especially in the development of industrial revolution 4.0 with the Internet of Things (IoT).

- According to the development of the 21st century, it is necessary to develop practical learning media by taking the digitization of the learning process as an option in the learning process.

- Universities must seek to collaborate with industry systematically with a clear regulation so that students get the opportunity to carry out practical learning processes in the industry.
- The increase in the number of lecturers in several courses is in line with the number of lecturers who enter the retirement period so that the learning process is not disturbed. In this case, a high standard of lecturers must be set to facilitate a quality learning process.
- Universities are advised to establish a third-party assessment and certification system for all graduates from the TVET faculty so that the quality of graduates can be measured and able to answer the challenges of competent teacher needs.

7.3.2 Recommendations for Future Researcher

For future researchers, this research can be used as a reference for conducting research with a different focus and context, such as:

- effectiveness of the implementation of teaching internships for prospective teachers.
- Students' perceptions of the practical learning process carried out in TVET faculty.
- Implementation of learning evaluation in TVET faculty.
- The effectiveness of practical fieldwork in the industry for students.
- Initial TVET Teacher curriculum analysis.
- Learning strategy development in TVET Faculty.

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APPENDIX 1 – Interview Guidelines

Interview Guidelines for Lecturer

Introduction :

Dear study participants,

Thank you very much for participating in this research interview.

First, please let me briefly introduce myself and the reason why I need to interview you. My name is Moh Sanni Mufti Alamsyah, a doctoral student at Otto Von Guericke University Magdeburg. My dissertation aims to explore the connection between practical lesson held by University in FPTK UPI and Implementation of teaching internship activity held by student university in secondary vocational schools in Indonesia to find what is factor influence the skills deficit held by prospective teachers. So interviewing you will helps me to get the information needed of this research inquiry.

To meet my research objectives, I have a few guiding question on the related topics below :

- Background education and work experiences

- Additional trainings received, if any

- Problems face when conduct practical lesson in workshop

- Current teaching responsibility

- Typical challenges experienced during your classes and solutions used

If my questions are not clear to you, please feel free to ask me for clarification at any time. As necessary, I will request you to elaborate or clarify on your answers too. We would cut out some topics above if they were not relevant in your situation. The interview will take about 45 – 60 minutes. It will be recorded for the later transcription and analysis. All information provided will be transcribed and narrated anonymously.

Interview information

Interview Nr.:		Name:		Place:	
Date:		Start:		End:	

<div align="center">**Interview Questions**</div>

<div align="center">**For lectures in University**</div>

A. Introduction

1. Can you describe in short explanation about yourself ?

2. Can you describe about your responsibility in learning process at the faculty?

B. General

1. Can You describe about curriculum development in your faculty?

2. To achieve the expected competencies, can you describe the concepts that are implemented in your faculty especially for the practice learning process?

3. How about the practical learning process scheduling, can you describe it?

C. Learning Activity

1. In the practical learning process at the workshop, can you explain how you prepare practical learning process for students in your faculty?

2. If there are a large number of students, how you conduct the learning process in workshop, can you explain?

3. Can you describe about cooperation with other institution related to the practical learning process?

4. Can you describe about kind of practice assignment given to students?

5. Can you describe about the assignment evaluation during learning process?

D. Learning Evaluation

1. Can you describe how the assessment is done to measure the achievements (practical competency) of the students?

2. Can you describe about the evaluation process in your courses?

<div align="center">Thank You for Cooperation</div>

Interview Guidelines for Teacher

Introduction :

Dear study participants,

Thank you very much for participating in this research interview.

First, please let me briefly introduce my self and the reason why I need to interview you. My name is Moh Sanni Mufti Alamsyah, a doctoral student at Otto Von Guericke University Magdeburg. My dissertation aims to explore the connection between practical lesson held by University in FPTK UPI and Implementation of teaching internship activity held by student university in secondary vocational schools in Indonesia to find what is factor influence the skills deficit held by prospective teachers. So interviewing you will helps me to get the information needed of this research inquiry.

To meet my research objectives, I have a few guiding question on the related topics below :

- Background education and work experiences
- Additional trainings received, if any
- Current teaching responsibility
- Typical challenges experienced during your supervise the internship teacher from University

If my questions are not clear to you, please feel free to ask me for clarification at any time. As necessary, I will request you to elaborate or clarify on your answers too. We would cut out some topics above if they were not relevant in your situation. The interview will take about 45 – 60 minutes. It will be recorded for the later transcription and analysis. All information provided will be transcribed and narrated anonymously.

Interview information

Interview Nr.:		Name:		Place:	
Date:		Start:		End:	

Interview Questions
For Teachers in Secondary Vocational School

A. Introduction

1. Can you describe in short explanation about yourself ?

2. Can you describe about your responsibility in teaching internship activity at your school?

B. General

1. Can you describe how the procedure of teaching internship for prospective teachers at your school?

2. Can you explain the handover the authority of teaching internship activity from university to schools?

C. Teaching Internship Activity

1. After you have the official assignment to supervise prospective teacher, what kind of activity you conducted to start the program?

2. Can you describe tasks arrangement between the Internship Teachers and regular Teachers at your school?

3. Can you describe the role of the internship teacher in practical lesson at your school?

4. From your observation, can you describe about the level of practical skill possessed by the internship teacher?

5. Can you describe how the practical skills from internship teachers are suitable with school needs?

6. From your observation, can the internship teachers solve the problems faced by students when practical lesson is carried out?

D. Evaluation of the program

1. Can you describe what deficiency from Internship Teachers still have when teaching practice to students?

2. Can you describe the evaluation process at the end of the program?

Thank You for Cooperation

APPENDIX 2 – Declaration of Consent

Declaration of consent

Purpose:

The research seeks to investigate to explore the connection between practical lesson held by University in FPTK UPI and Implementation of teaching internship activity held by student university in secondary vocational schools in Indonesia to find what is factor influence the skills deficit held by prospective teachers.

What you will do in this research:

If you decide to volunteer, you will be asked to participate in one interview. You will be asked several questions about your personal opinion and experience. The interview will be audio recorded to further process the content of it.

Time frame:

The interview will take approximately 45-60 minutes.

Confidentiality:

All responses that you give during the interview are anonymous and will be treated confidentially. At no time your identity will be revealed. After the completion of the study the results will be included in my dissertation and provided to you upon request. The audio records of the interview will be transcribed later on. Your name and the institution you work for will not be saved. Any company you mention during the interview will be anonymized. The recording will be destroyed after the completion of my studies. The transcript, without your name, will be kept until the research is complete.

Participation and withdrawal:

Your participation in this study is completely voluntary and you may refuse to participate or withdraw from the study without any consequences. If you don't feel like answering, you may skip any question during the interview.

Declaration:

I am participating voluntarily in this research about what kind of skills deficit and its factors influence, owned by prospective mechanical engineering teachers related to the school needs for competent teachers. I understand that the research project is carried out for a dissertation and that it is not related to any commercial or personal interest. I agree that the data I am providing will be used only for scientific purposes. I understand that the information I give is strictly confidential, and that my name will not be included in any report of the study. I will be providing truthful information.

The nature and purpose of this research have been sufficiently explained and I agree to participate in this study. I understand that I am free to withdraw at any time without any consequences.

Name (not mandatory): _____ Date: _____

Signature: _____

APPENDIX 3 - Interview Transcript List

NO	CODE	POSITION	ROLE IN INTERNSHIP PROGRAM	AGE	SPECIALIZATION	INSTTUTION
1	UL 1	Lecturer	Internship supervisor	40-45	AUTOMOTIVE	UPI
2	UL 2	Lecturer	Internship supervisor	>55	CNC	UPI
3	UL 3	Lecturer	Internship supervisor	40-45	REFRIGERATION	UPI
4	UL 4	Lecturer	Internship supervisor	40-45	WELDING	UPI
5	UL 5	Lecturer	Internship supervisor	50-55	AUTOMOTIVE	UPI
6	UL 6	Lecturer	Internship supervisor	50-55	MACHINING	UPI
7	UL 7	Lecturer	Internship supervisor	45-50	WELDING	UPI
8	UL 8	Lecturer	Internship supervisor	45-50	HYDROLIC AND PNEUMATIC	UPI
9	UL 9	Lecturer	Internship supervisor	45-50	REFRIGERATION	UPI
10	UL 10	Lecturer	Internship supervisor	40-45	MACHINING	UPI
11	TVS 1	Teacher	Supervisor teacher	40-45	REFRIGERATION	SMK 1 CIMAHI
12	TVS 1	Teacher	Supervisor teacher	40-45	REFRIGERATION	SMK 1 CIMAHI
13	TVS 1	Teacher	Supervisor teacher	40-45	REFRIGERATION	SMK 1 CIMAHI
14	TVS 1	Teacher	Supervisor teacher	40-45	FABRICATION	SMK 12 BANDUNG
15	TVS 1	Teacher	Supervisor teacher	50-55	FABRICATION	SMK 12 BANDUNG
16	TVS 1	Teacher	Supervisor teacher	>55	FABRICATION	SMK 12 BANDUNG
17	TVS 1	Teacher	Supervisor teacher	40-45	WELDING	SMK 2 BANDUNG
18	TVS 1	Teacher	Supervisor teacher	>55	WELDING	SMK 2 BANDUNG
19	TVS 1	Teacher	Supervisor teacher	>55	MACHINING	SMK 12 BANDUNG
20	TVS 1	Teacher	Supervisor teacher	>55	MACHINING	SMK 12 BANDUNG

APPENDIX 4 – Declaration of Originality

Ehrenerklärung

Ich versichere hiermit, dass ich die vorliegende Arbeit ohne unzulässige Hilfe Dritter und ohne Benut- zung anderer als der angegebenen Hilfsmittel angefertigt habe.

Verwendete fremde und eigene Quellen sind als solche kenntlich gemacht.

Ich habe nicht die Hilfe eines kommerziellen Promotionsberaters in Anspruch genommen. Ich habe insbesondere nicht wissentlich:

- Ergebnisse erfunden oder widersprüchliche Ergebnisse verschwiegen
- statistische Verfahren absichtlich missbraucht, um Daten in wissenschaftlich ungerechtfertigter Weise zu interpretieren
- fremde Ergebnisse oder Veröffentlichungen plagiiert
- fremde Forschungsergebnisse verzerrt wiedergegeben.

Mit ist bekannt, dass Verstöße gegen das Urheberrecht Unterlassungs- und Schadensersatzansprüche des Urhebers sowie eine strafrechtliche Ahndung durch die Strafverfolgungsbehörden begründen können.

Die Arbeit wurde bisher weder im Inland noch im Ausland in gleicher oder ähnlicher Form als Disserta- tion eingereicht und ist als Ganzes auch noch nicht veröffentlicht.

Ich erkläre mich damit einverstanden, dass die Dissertation ggf. mit Mitteln der elektronischen Daten- verarbeitung auf Plagiate überprüft werden kann.

Magdeburg, 01.09.2021

Moh Sanni Mufti Alamsyah

Matrikelnr.: 221652

Declaration of Originality

I hereby affirm that I have completed the present work without the unauthorized
help of third parties and without using any aids other than those specified.
External and own sources used are marked as such.
I did not seek the help of a commercial PhD advisor. In particular, I do not
knowingly:

- Invented results or withheld contradicting results
- Statistical procedures are intentionally misused in order to transform data
  into a scientifically unjustified way to interpret
- plagiarized third-party results or publications
- Foreign research results are distorted.

I am aware that violations of copyright law can justify injunctive relief and claims
for damages on the part of the author as
well as criminal penalties by the law enforcement authorities.

The thesis has not yet been submitted in the same or a similar form as a
dissertation in Germany or abroad and has not yet been published as a whole.
I agree that the dissertation can be checked for plagiarism using electronic data
processing.

Magdeburg, 01.09.2021

Moh Sanni Mufti Alamsyah
Matrikelnr.: 221652