

PROCEEDINGS

International Conference

Asosiasi Pendidikan Teknologi dan Kejuruan Indonesia (APTEKINDO) 2018

Theme:

**“Revitalization of Technical and Vocational Education to Face
Industrial Revolution 4.0”**

Surabaya, 11-14 July 2018

Speakers:

Prof. Dr. Muhadjir Effendy, MAP.
Minister of Education and Culture, Republic of Indonesia

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*Extraordinary and Plenipotentiary Ambassador of the Federal Republic of Germany to
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Rector of Universitas Negeri Surabaya period 2010-2014 (Indonesia)



Faculty of Engineering
Universitas Negeri Surabaya
2018

PROCEEDINGS

International Conference

Asosiasi Pendidikan Teknologi dan Kejuruan Indonesia (APTEKINDO) 2018

Theme:

“Revitalization of Technical and Vocational Education to Face Industrial Revolution 4.0”

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PREFACE

All praises be to Allah SWT, so that the 2018 International Conference of ***Asosiasi Pendidikan Teknologi dan Kejuruan Indonesia (APTEKINDO)*** could be held in Surabaya during 11-14 July 2018. APTEKINDO International Conference is conducted biennially in which this year host is Faculty of Engineering, State University of Surabaya. There were sixteen colleges attending this year Conference, most of which were former Institutes of Teacher's Education (LPTK).

This year theme is "*Revitalization of Technical and Vocational Education to Face Industrial Revolution 4.0*" aimed to respond to the development and acceleration of the industrial revolution 4.0 that has become the most discussed issues in many countries. Industrial revolution connects machines with internet systems. In regard to facing such phenomena, Indonesian government through the Ministry of Industry has launched "Making Indonesia 4.0", of which the program focuses on industries that are driving the development of the industrial revolution 4.0 such as food and beverages, electronics, automotive, textiles and chemicals. To achieve better results of the program actualization, vocational education helps to prepare compatible and competitive workers for the areas of the aforementioned industries. Henceforth, numbers of Conferences, conventions, and meetings among Indonesian practitioners in FPTK / FT-JPTK need to be held to initiate ideas in strengthening the role of LPTK within industrial revolution 4.0 era.

The Conference's proceedings contain 121 research papers and ideas that are relevant to the following nine sub-themes: *Technical and Vocational Teacher Competencies, Technical and Vocational Education Curricula, Technical and Vocational Education Models, Technical and Vocational Education Evaluation, Technical and Vocational Education Policy, Public-private Partnership in Technical and Vocational Education, Technical and Vocational Education Management, Technopreneurship, and Competencies Certification.*

Finally, all the committees send their gratitude to the participating speakers and all parties who support the run of the Conference. They also apologize for any inconvenience and wish a better undertaking event next year.

WELCOMING SPEECH RECTOR UNESA

Conference and Convention

Asosiasi Pendidikan Teknologi dan Kejuruan Indonesia (Aptekindo) 2018

Rich Palace Hotel Surabaya, 11-14 Juli 2018

Assalammu'alaikum Warahmatullahi Wabarakatuh.

Respectable Head of Universities, members of APTEKINDO

Distinguished Keynote speakers

Honorable authors, and fellow participants of APTEKINDO Conference and Convention 2018

Alhamdulillah, first of all, let us express our gratitude to Allah SWT because of his grace and blessings, we are able to attend this international Conference and convention of the Indonesia Association of Technology and Vocational Education or ***Asosiasi Pendidikan Teknologi dan Kejuruan Indonesia (APTEKINDO)*** held in Surabaya, 11-14 July 2018.

This international and national Conference is conducted biennially as a routine agenda held by Association of Technology and Vocational Education or *Asosiasi Pendidikan Teknologi dan Kejuruan Indonesia (APTEKINDO)*, which consists of 16 different universities throughout Indonesia. We would like to thank for the opportunity given to Universitas Negeri Surabaya for hosting this year event.

In the raise of industrial revolution, Conferences, gatherings, and sharing of knowledge play an important meaning in supporting the acceleration of innovative science and technology. Therefore, this Conference's theme is ***"Revitalization of Technical and Vocational Education to Face Industrial Revolution 4.0"***. This is an interesting and challenging topic not only for academic researchers but also for stakeholders and industry owners.

Ladies and gentlemen,

Since 2011, the industrial sector has been integrated with the online system known as industrial revolution 4.0. The first industrial revolution was marked by the use of steam engines to replace human and animal power. The second stage of the revolution was marked by the utilization of electrical power and the concept of mass production. Furthermore, the application of automation technology brought the industrial revolution to its third stage. Tremendous revolution happened when information and communication technology was introduced and fully utilized in industrial area, of which the condition brought the world in the fourth stage of the industrial revolution. The utilization of this technology changed not only the production process, but also across the industrial chains that result in a new digital-based business model which can achieve higher efficiency and better quality in industrial products. The consequences of this revolution are the increase of production efficiency as well as changes in the employment prerequisite. There is an increasing demand for new manpower, whilst the machines are replacing the role of workers. This condition leads to the importance of a new and more advanced method of preparing human resources that are ready to compete in the industrial revolution.

Ladies and gentlemen, in regard to prepare Indonesian human resource in facing the era of media convergence, there are at least two aspects that need our attention, namely the quality of human resources in accordance with the requirement of the digital-based industry and the equal distribution of qualified human resources especially in suburban and urban areas. Both aspects could be meant as a challenge and an opportunity for the higher education especially technology and vocational education to innovate and harmonize curriculum that connects with the industry. Thus, this Conference becomes a perfect momentum for technology and vocational education to join and strengthen steps in preparing graduates that are ready to compete in the industrial revolution 4.0. Therefore, by starting with **“Bismillahirrahmanirrahim” The Conference and Convention of Association of Technology and Vocational Education or APTEKINDO 2018, is officially started**”

Ladies and gentlemen, we would like to thank the keynote speakers who are willing to attend and share knowledge in today’s Conference:

1. Prof. Dr. Muhadjir Effendy, MAP. Minister of Education and Culture, Republic of Indonesia
2. Michael Freiherr Von Ungern–Sternberg, ***Extraordinary and Plenipotentiary Ambassador of the Federal Republic of Germany to Indonesia, ASEAN and Timor-Leste.***
3. Prof. Dr. Wenny Rahayu, *La Trobe University Victoria (Australia)*
4. Prof. Dr. Muchlas Samani, M.Pd., *Rector Universitas Negeri Surabaya (2010-2014).*

We also would like to thank the authors and all participants of the convention who have participated and contributed to sharing the knowledge and ideas. Hopefully, what we share and get here today can give benefits and contribute to improve a competitive atmosphere in Indonesia, Aamiin YRA.

Surabaya, July 2018
Universitas Negeri Surabaya
Rektor,

Prof. Dr. Warsono, M.S.

WELCOME SPEECH BY THE DEAN OF FACULTY OF ENGINEERING
at the International Conference and National Convention of
Asosiasi Pendidikan Teknologi dan Kejuruan Indonesia (APTEKINDO) 2018
Rich Palace Hotel, 12 July 2018

Assalamu'alaikum Warahmatullahi Wabarakatuh.

His Excellency, Rector of Universitas Negeri Surabaya
Respectable the Head of Universities as the members of APTEKINDO
Distinguished Keynote Speakers
Honorable authors and Participants

Alhamdulillahirobbil alamiin. Thanks God. First of all, let us express our gratitude to Allah SWT because of his grace and blessings we are able to attend the 9th International Conference and convention of ***Asosiasi Pendidikan Teknologi dan Kejuruan Indonesia (APTEKINDO)*** and the 19th workshop of the Technology and Vocational Education for FPTK/FT/FTK-JPTK in Indonesia. It is an honor for us, the Faculty of Engineering, Universitas Negeri Surabaya, to host this year Conference and convention.

On behalf of *Asosiasi Pendidikan Teknologi dan Kejuruan Indonesia (APTEKINDO)*, we would like to welcome keynote speakers, authors, delegates and participants from technology and vocational education to the city of heroes, Surabaya.

Today, we meet in Surabaya to attend a biennial agenda named APTEKINDO International Conference and Convention and National Workshop of the FPTK/FT/FTK-JPTK. Following the mandate from the 2016 APTEKINDO Convention in Medan, this year's Conference is held in Surabaya hosted by the Faculty of Engineering, Universitas Negeri Surabaya.

Ladies and Gentlemen, the theme of this year Conference is "*Revitalization of Technical and Vocational Education to Face Industrial Revolution 4.0*". The theme is chosen due to the fact that we have to quickly respond and act accordingly to the effects of the industrial revolution on vocational education. Well-programmed and structured efforts should be undertaken to ensure if technology and vocational education can produce globally competitive graduates especially for industrial revolution era.

Numbers of important topics for technology and vocational education are discussed in this Conference. The topics include Technical and Vocational Teacher Competencies, Technical and Vocational Education Curricula, Technical and Vocational Education Models, Technical and Vocational Education Evaluation, Technical and Vocational Education Policy, Public-private Partnership in Technical and Vocational Education, Technical and Vocational Education Management, Technopreneurship, and Competence Certification.

Today's Conference has several outcomes. The accepted articles will be submitted for proceeding publication indexed by Atlantic Press. Meanwhile, the rejected articles by Atlantic Press will be published in the International Proceedings with International Standard Book Number (ISBN). Moreover, the articles written in Bahasa Indonesia will be published in the National Proceedings with ISBN.

Ladies and Gentleman, this meeting must be meaningful as a venue to communicate among researchers, academics, and members of FPTK / FT / FTK-JPTK from different universities as well as from related industries. By this regular Conference and convention, we can make a strong communication network and create innovative breakthrough and substantial blueprint of different aspects such as institutional quality, field study, and curriculum. We hope that this forum plays an important role in developing technology and vocational education to face the industrial revolution 4.0.

Finally, we would like to thank the organizing committee led by Mr.Tri Wrahatnolo, M.Pd., M.T., who gave an extraordinary support. Moreover, we would like to express our appreciation and gratitude to the members of steering committee from various regions in Indonesia, delegates, SC and OC members, sponsors, as well as personal or institutional support that make this event well-organized. I apologize if there are shortcomings from my part.

Good luck with the Conference of Indonesian Association of Technology and Vocational Education, APTEKINDO 2018, and wish the best improvement for technology and vocational education in Indonesia. Thank you.

Wassalammu'alaikum Warahmatullahi Wabarakatuh

CHAIRMAN'S SPEECH

**at the International Conference and National Convention of
*Asosiasi Pendidikan Teknologi dan Kejuruan Indonesia (APTEKINDO) 2018***

Rich Palace Hotel, 11-14 July 2018

Assalammu'alaikum Warahmatullahi Wabarakatuh.

His Excellency, Rector of Universitas Negeri Surabaya,
Respectable the Head of Universities, members of Aptekindo, Keynote speakers, Authors, and fellow participants of Aptekindo Conference and convention 2018.

Alhamdulillah, no words could represent the feelings but the gratitude of the presence of Allah SWT, for His blessings, so that we can attend APTEKINDO Conference with the theme "*Revitalization of Technical and Vocational Education to Face Industrial Revolution 4.0*".

In this pleased occasion, we would like to welcome all keynote speakers, authors, and participants of the Conference to this city of heroes, the city of heroic histories, Surabaya. We would like also to welcome to APTEKINDO 2018 Conference and convention held at the Rich Palace Hotel Surabaya, 11-14 July 2018.

The theme of this year Conference is "*Revitalization of Technical and Vocational Education to Face Industrial Revolution 4.0*". This theme is chosen to respond to the development and acceleration of industrial revolution 4.0 that has been impactful in various countries. This industrial revolution has connected the utilization of machines to an internet system. To face such phenomena, Indonesian government through the Ministry of Industry has launched a program called "Making Indonesia 4.0". Currently, the government is focusing on industries that support the development of the industrial revolution such as food and beverage, electronics industry, automotive, textile and clothing, and chemical industries.

In addition, vocational education plays an important role in preparing competent and competitive human resources. That is, Faculty of Technical and Vocational Education or *Fakultas Pendidikan Teknik dan Kejuruan (FPTK)* in Indonesia aims to compile excellent ideas and vision, which later could be shared through Conferences, conventions or meetings, and also be useful to encounter industrial revolution 4.0.

Today's Conference will present competent keynote speakers in the field of technology and vocational education, who are:

1. Prof. Dr. Muhadjir Effendy, MAP. Minister of Education and Culture, Republic of Indonesia
2. Michael Freiherr Von Ungern-Sternberg, Extraordinary and Plenipotentiary Ambassador of the Federal Republic of Germany to Indonesia, ASEAN and Timor-Leste.
2. Prof. Dr. Wenny Rahayu, La Trobe University Victoria (Australia)
3. Prof. Dr. Muchlas Samani, M.Pd., Rector of Universitas Negeri Surabaya (2010-2014).

In addition, I would like to point out that there are 602 participants from 17 different universities participating in today's Conference involving:

1. Universitas Palangka Raya
2. Universitas Gorontalo
3. Universitas Islam Negeri Ar Raniry Aceh
4. Universitas Negeri Solo
5. Universitas Negeri Manado
6. Universitas Pendidikan Ganesha
7. Universitas Nusa Cendana
8. Universitas Malang
9. Universitas Negeri Jakarta
10. Universitas Negeri Padang
11. Universitas Negeri Yogyakarta
12. Universitas Pendidikan Indonesia
13. Universitas Negeri Makassar
14. Universitas Negeri Semarang
15. Universitas Negeri Medan
16. Universitas Negeri Surabaya
17. Universitas PGRI Adi Buana Surabaya

There are 491 articles submitted to this Conferences covering papers and posters. 76 articles were accepted to Atlantic Press, 156 articles published in international proceedings with ISBN, dan 129 articles published in the national proceedings with ISBN. All articles will be available for an online access through the Atlantis Press official website and through APTEKINDO 2018 website.

Today's Conference is actually held with the helps and good cooperation of various parties. Therefore, we would like to express our gratitude to the Minister of Research, Technology and Higher Education, Rector of Universitas Negeri Surabaya, keynote speakers, participants, sponsors, and other stakeholders for the supports. We also send our highest appreciation to the committees who have worked hard to succeed this Conference.

At last, we hope that all participants get benefits and knowledge that can contribute to reinforce vocational education and technology in facing the industrial revolution 4.0. WELCOME TO APTEKINDO CONFERENCE AND CONVENTION 2018, Thank you.

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Continuous Professional Development Profile of Mechanical and Automotive Teacher at Vocational High School in South Sulawesi Indonesia

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Abstract—This study aims to describe profile of continuous professional development (CPD) followed by mechanical and automotive productive teacher at vocational high school (SMK) in South Sulawesi. The research method used is survey research. The total population of 606 teachers scattered in 24 regencies/cities in South Sulawesi. Proportional random sampling technique use in this research to carry out 252 respondent. Data analysis in this research is quantitative descriptive analysis technique. Statistical analysis is used to obtain answer from the objectives that proposed in this study. The result shows for CPD in training form that most frequently attended teacher is in house training (IHT), followed by internal school coaching, tiered and special training, school partnerships, further education, distance learning, short courses in educational institutions (LPTK) and internship programs. While for CPD non-training form in a row is the creation of media and technology works, classroom action research, learning workshop, writing teaching materials, educational discussions and Conferences and conferences.

Keywords—*continuous professional development, productive teacher, vocational high school*

I. INTRODUCTION

Law number 14 year 2005 regarding teachers and lecturers demands that teachers be professional in doing their work. As a competent professional, teachers are always required to develop themselves in line with the progress of science, technology, to have the skills that meet certain quality standards or norms and require professional education. Teachers as professions that require mastery of a number of competencies (Uygun, et.al., 2015). Teachers are a key asset for schools so they need to be well prepared and trained early in their careers and continued with high-quality professional development in later years (Ozdemir, 2013).

Government regulation number 74 of 2005 on teachers explained that in the framework of teacher professional development, there are two categories, namely (1) guidance and professional development and (2) guidance and career development. Guidance and professional development of teachers for further termed the continuous professional

development (CPD) includes four competencies that must be owned by a teacher as a professional namely, pedagogic, personality, social and professional competence. Teachers as a professional of course have a deep mastery of knowledge and the ability of a qualified learning management. Teachers should follow the development/change paradigm at any time because it will affect the practice of learning (Payong, 2011). It is this reason that underpins the importance of teachers doing CPD.

Each teacher has equal rights in the development of his profession, but in practice, they will have different needs for his/her professional development so that becomes diverse. These needs can be grouped into five categories, namely understanding of the context of learning, strengthening the mastery of teaching materials, the development of teaching methods, learning innovation and experience of current theories. Cheng (2006) explains that teacher careers are traversed in several stages of the preparation and development process, starting with teacher education, induction programs for novice teachers, and professional development as teachers. The teacher does continuous learning to improve their knowledge, skills and ability to develop positive values for the benefit of their students. Teachers also become models for their students about the concept of lifelong learning embodied with CPD.

CPD plays an important role to assist teachers in developing their capacity to learn and research to improve their teaching skills so that they can contribute to the development of the school, which ultimately improves student learning. It can be concluded that in every system and level of education including SMK in filed of mechanical and automotive, the most important is to encourage teachers to conduct CPD.

Professional development means maintaining, upgrading and expanding relevant knowledge and skills in specific areas of expertise or vocation, and in teaching and learning methods so as to have a positive impact on learners' practices and learning experiences. It is not enough just to be good on both aspects, mastering the field of expertise and how to teach it, but it takes continuous effort to become better and better in the field we are in and how to teach it (Kelly, 2013). CPD Cycle

for individual teachers refers to experimental learning cycle Kolb starts from observation process of CPD activities that have been done, followed by CPD plan ahead. Next step are recording activities to be done, to get and collect input from the colleagues about the CPD plan. The next stage, to evaluate the selection of activities, and then review the CPD plan. Finally made a statement about how many CPDs have been done to improve professional attitudes.

Within the framework of the three pillars of teacher development, CPD is sometimes preceded by performance appraisal and competency testing. From these two processes, the performance and competence will be obtained. This is to further become one of the foundations in improving teacher competence. It can be concluded that the results of performance appraisal and competency test become one of the main bases for the design of teacher competency improvement program. Several methods that can be used in the framework of sustainable professional development can be pursued with educational and training activities, such as in house training (IHT), internship program, school partnership, distance learning, tiered and specialized training, short courses in LPTK, internal coaching schools, and further education. Other activities besides education and training include: discussion of education issues, Conferences, workshops, research, writing / making of textbooks, making learning media, and making technology / artworks.

CPD benefits for learners is a guarantee of certainty to get an effective learning experience to increase self-potential optimally. For teachers, it is expected to increase the mastery of science, technology, and art and have a strong character in accordance with the profession so as to anticipate external and internal changes to fulfill the learning needs of learners facing life in the future. Ministerial regulation of the empowerment of state apparatus and bureaucratic reform (Permen PAN dan RB) number 16 Year 2009 explained that there are three elements of teacher activities in CPD that can support teacher career development, namely self-development, scientific publications, and innovative work. These three components in the implementation need to be done in a sustainable manner, so that the teacher can maintain and improve the professionalism.

II. METHODS

The approach used in this research is quantitative approach with non experimental design (Bordens & Abbott, 2008: 216), because the researcher did not give treatment to the research subject. The type of this study is survey research (Mitchell & Jolley, 2007: 208), because the sample data studied is taken from the population and research using questionnaires to the respondents about the CPD that conducted by them since they become a teacher. The population in this research is productive teachers of mechanical and automotive at vocational high school in South

Sulawesi, spread over 24 regencies / cities that have passed the teacher competence test 2015 as many as 606 people. Productive teachers of mechanical and automotive is a teacher on field of expertise in machining engineering, welding engineering, light vehicle engineering, and motorcycle

engineering. Samples were taken that represented the distribution of SMK to the district/city. The sampling technique is very important in behavioral research, and aims to make the findings of economical and accurate research. A good sample is representative or random to provide maximum information about generalization of research data (Singh, 2006: 81). Determination of teacher sample size using random number table from Issac and Michael (1984: 193) with margin error $\alpha = 5\%$. Based on the table, with population number 606 obtained sample for 252 Teachers. The sampling technique used is combined sampling, because the sampling technique used involves more than one method or combined sampling, i.e. cluster sampling, proportional random sampling, and stratified random sampling. Cluster sampling is used to view sample spreads in each district / city and on each field of expertise. The sample size of each district / city is distributed using proportional random sampling technique. The research instrument was developed to obtain data of CPD variables that consist of two sub variables namely CPD training form and CPD non-training form. CPD training form had indicators: in house training, internship programs, school partnerships, distance learning, tiered and special training, short courses in educational institutions (LPTK), internal school coaching, and further education. While the indicator of for CPD nontraining form are educational discussions, Conferences and conferences, workshop of learning, classroom action research, writing teaching materials, and the making of learning media and technology works. This study is a survey by using questionnaires as a means of collecting data. Before the instrument is used to retrieve the data, firstly done the content validity by the expert that followed by criteria validity of research instruments by conducting instrument test on 30 teachers. Data were collected by self-administered questionnaires in the presence of the researcher, in which respondents would answer questions or revelations in questionnaires in the presence of researchers without the help of researchers (Cohen, 2007: 344). The presence of researchers on questionnaires aims to help respondents to explain the questions that are less clear. In addition, it is usually also done to ensure a good response rate and ensure that all questions are completed properly and correctly. The main advantage of the questionnaire is that it allows broad reach at minimal cost, wider geographical coverage by large sample selection and more representative (Singh, 2006: 108).

Data analysis technique used in this research is quantitative descriptive analysis technique. Descriptive analysis is used to interpret the data from variables that represent answers to research questions and to get result for both CPD form of training and non-training. It can be explained from construct of eight indicator of CPD training form, and six indicator of CPD non-training form to the productive teachers of mechanical and automotive at SMK in South Sulawesi.

III. RESULT AND DISCUSSIONS

Description of CPD research data presented in the form of average, median, mode, standard deviation, data summary in the form of frequency distribution and diagrams, as well as descriptive interpretation of sub variables CPD training form

and CPD non-training form based on their indicators respectively.

A. CPD Training Form

Data CPD training form were revealed with a questionnaire consisting of 21 point statements based on likert scale 1-4. The minimum scores of criteria is 21, the maximum scores of criteria is 84 so that the criterion criteria (X_k) is 52.5 and the standard deviation criterion (σ_k) is 10.5. The result data showed that the minimum score of CPD training form is 32, maximum score is 78, average score 52,6, median 52, mode 49, and standard deviation 9.35. Furthermore, by using the mean value of criteria ($X_k = 52.5$) and standard deviation criterion ($\sigma_k = 10,5$), it can be classified the total score of PKB variables in the form of training in five categories as in Table 1. The average score of research results when compared with the classification criteria in Table 1, shows that respondents perceive the CPD training form is in the moderate category with a percentage of 40.08%, with the detail of respondent perceive as follows, 2.38% in very low category, 29.76% in low category, 40.08% in medium category, 22.62% in high category, and only 5.16% is very high category.

TABLE I. CLASSIFICATION CRITERIA SCORE CPD TRAINING FORM

No.	Category	Interval	Frequency	Percentage
1	Very Low	21 – 37	6	2,38 %
2	Low	38 – 47	75	29,76 %
3	Medium	48 – 58	101	40,08 %
4	High	59 – 68	57	22,62 %
5	Very High	69 – 84	13	5,16 %
	Total		252	100,00 %

Descriptive analysis also aims to see the achievement score or percentage of each indicator on the CPD training form by comparing the total score achieved with the highest expected total score. Total score of CPD training form obtained is 13.257, while the highest total score expected is 21.168 so the level of achievement of total score CPD training form only reaches 62,6% from total expected highest score. CPD training form can be observed from the eight indicators, namely: (1) in house training (PL1); (2) internship program (PL2); (3) school partnerships (PL3); (4) distance learning (PL4); (5) tiered and specialized training (PL5); (6) short courses in LPTK (PL6); (7) internal coaching school (PL7); and (8) further education (PL8). Description of data CPD training from indicators is presented in Figure 1.

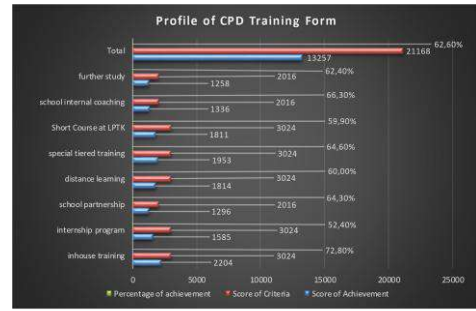


FIGURE 1. CPD training form for productive teacher in field of mechanical and automotive at SMK in South Sulawesi

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Based on Figure 1 it can be concluded that from eight indicators of CPD training form, the first indicator, that is in house training (PL1) has the highest achievement score 72.8% and the second indicator is teacher apprenticeship program has the lowest achievement score 52.4% based on the average achievement for eight indicators that is 64.21%.

Therefore, the level of achievement for each indicator of CPD training form for vocational teachers in the field of mechanical and automotive, at SMK in south Sulawesi is in the medium category of expected frequency of the score.

Descriptive description of CPD grouped into two major groups, namely CPD training form and CPD non-training form. The two forms of CPD observed in this study are a description of the CPD activities achievement by productive teachers in field of mechanical and automotive expertise program. CPD training form consists of eight programs with sequence of activities by teachers ranging from the highest to the lowest, starting from in house training, internal coaching by schools, special tiered training, school partnerships, further education, distance learning, courses at the LPTK, and internship programs. From the eight indicator observed it seen that teachers generally prefer CPD activities that can be implemented in schools so as not to disrupt the learning process at school.

This is in line with the principle of CPD implementation that is done structurally, systematically and in the implementation is adjusted to the needs of teachers without disturbing the learning process in school (Kemdikbud, 2016). Support to the strengthening of professional competence of teachers, especially in the case of mastery in the form of real practice is still less visible from the low implementation of the apprenticeship program followed by teachers so that the need to increase the activity by optimizing the cooperation that has been established between schools with entrepreneurship and industry (DU-DI) partners, while looking for opportunities to increase partnerships with other relevant agencies. One solution that can be offered is the effort to bring DU-DI to school in the form of teaching factory. With this pattern, teachers and students jointly undertake a DU-DI based learning process that will indirectly impact on improving teacher competence from the aspect of real practice.

B. CPD Non-Training Form

Data CPD non-training form were revealed with a questionnaire consisting of 18 point statements based on likert scale 1-4. The minimum scores of criteria is 18, the maximum scores of criteria is 72 so that the criterion criteria (\bar{X}_k) is 45 and the standard deviation criterion (σ_k) is 9. The result data showed that the minimum score of CPD non-training form is 29, maximum score is 69, average score 46,7, median 47, mode 54, and standard deviation 8.5. Furthermore, by using the mean value of criteria ($\bar{X}_k = 45$) and standard deviation criterion ($\sigma_k = 9$), it can be classified the total score of PKB variables in the form of training in five categories as in Table 3. The average score of research results when compared with the classification criteria in Table 2, shows that respondents perceive the CPD non-training form is in the moderate category with a percentage of 41.67%, with the detail of respondent perceive as follows, 5.16% in very low category, 20.24% in low category, 41.67% in medium category, 26.19% in high category, and only 6.75% is very high category.

TABLE II. CLASSIFICATION CRITERIA SCORE CPD NON-TRAINING FORM

No.	Category	Interval	Frequency	Percentage
1	Very Low	18 - 32	13	5,16 %
2	Low	33 – 41	51	20,24 %
3	Medium	42 – 50	105	41,67 %
4	High	51 – 59	66	26,19 %
5	Very High	60 - 72	17	6,75%
	Total		252	100,00 %

Descriptive analysis also aims to see the achievement score or percentage of each indicator on the CPD nontraining form by comparing the total score achieved with the highest expected total score. Total score of CPD training form obtained is 11.778, while the highest total score expected is 18.144 so the level of achievement of total score CPD training form only reaches 64,9% from total expected highest score. CPD non-training form can be observed from the six indicators, namely: (1) discussion of education issues (ND1); (2) Conferences and conference (ND2); (3) learning workshop (ND3); (4) classroom action research (ND4); (5) writing teaching materials (ND5); and (6) creation of media and technology work (ND6), Description of data CPD training form indicators is presented in figure 2.

of media and technology work (ND6). Description of data CPD training from indicators is presented in Figure 2.



FIGURE 2. CPD non-training form for productive teacher in field of mechanical and automotive at SMK in South Sulawesi

Fig. 2. CPD non-training form for productive teacher in field of mechanical and automotive at SMK in South Sulawesi

Based on Figure 2, it can be concluded that from the six indicators of CPD non-training form shows that the sixth indicator, namely the creation of media and technology work (ND6) has the highest score achievement score of 72.5% and the second indicator, that is the participation in the Conference and conference has the level of achievement score the lowest by 53.6% of the average achievement for six indicators that is 64.9%. Therefore, the level of achievement for each indicator of CPD non-training form of productive teachers in field of mechanical and automotive at SMK in south sulawesi is still in the medium category of expected frequency.

The CPD non-training form consists of six observed activities ranging from the highest to the very least, starting from the creating of learning media and technology works, classroom action research, workshop of learning, writing of teaching materials, discussion of education issues, and the Conferences and conferences. The general explanation obtained from the results of this study is that the activities of CPD non-training form most widely implemented by teachers is an activity that its implementation is still in the school environment. This certainly can not be separated from the fact that the teacher still must be able to run the duties and functions in learning while still carrying out efforts to increase its competence.

Attending Conferences and conferences is one of the activities that can open the teacher's insight, especially in the creation of an opportunity to get the latest information about various matters relating to the implementation of education. Although to attend Conferences and conferences means that teachers should leave the learning process in the classroom, but efforts should be made to fulfill these activities in order to support the strengthening of teacher competence.

IV. CONCLUSIONS

Forms of CPD that have been implemented by productive teachers in field of mechanical and automotive at SMK in South Sulawesi, both for CPD training-form and CPD non-training form is mostly still implemented within the scope of the school. CPD training form the most widely conducted by teachers is in house training and the most rarely done by the teacher is an apprenticeship program. CPD non-training form that most followed by the teacher is the creating of learning media and technology works and the most rarely implemented is to attend Conferences and conferences. CPD implemented until now also shows a tendency to increase the competence of teachers in aspects of mastery theory, but still not touch the aspect of competence in the form of real practice. CPD which is the findings in this research generally only focuses on strengthening teacher competence theoretically through the activities of learner teacher (Guru Pembelajar) in 2016 and CPD to support learner teacher professional development (PPGP). This is not enough for productive teachers in SMK because a productive teacher must have dual competence for both mastery of theory and mastery of competence in real practice that up-to-date according to DU/DI. It is therefore

necessary to have a good partnership relationship between school and industry as a place where teachers regularly undertake internships to improve their competence by gaining real industry work experience. Another solution offered is bringing DU/DI to school in the form of a teaching factory. Its implementation is a combination of the TEFA model of school production unit plus oriented to the profitability of goods and services production activities and TEFA new model which emphasizes on the implementation of production process of goods or services that adopt and or adapt the production process of goods or services in DU/DI. With this pattern, teachers can organize CPD in the industry in the form of real learning in the classroom together with the learners.

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