

# Improving the Competency of Vocational School Teachers through Online Training

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## ABSTRACT

Improving the competency of teachers at a vocational school (SMK) in Bandung carried out by lecturers in the Chemical Engineering Department of Politeknik Negeri Bandung is the main goal of this study. This also answers the hopes and proposal of the Principal of this SMK to continue cooperation in improving SMK teachers which was conducted in 2020 by lecturers in Politeknik Negeri Bandung (Polban). The activity to increase the competency of SMKN teachers in 2021 focuses on activities to increase the competency in wastewater treatment operation and matters related to the dangers of the operation. This topic has been chosen because currently the practical activities on wastewater treatment has not been carried out at this SMK. This competence improving activity could enrich the knowledge of SMK teachers related to wastewater treatment and then the knowledge could be transferred to the students and to the existing laboratory assistants at this SMK. All participants in this online training are in the competent category because they passed the post-test of the four modules and obtained a minimum score of 70 for each module. The Laboratory of Industrial Waste and Water Treatment in the Chemical Engineering Department Polban has complete industrial wastewater treatment equipment, making it possible to create a new Chemical Engineering Scheme for the Competency Test Place (TUK) possessed by this Department. Thus by conducting the training for the SMK teachers, it is not only beneficial for the teachers of SMK Bandung but also beneficial for the TUK of the Department of Chemical Engineering Polban by preparing the new Wastewater Treatment Scheme.

**Keywords:** *Competency Training, Modules, TUK Scheme.*

## 1. INTRODUCTION

Politeknik Negeri Bandung (Polban) has a First Party Professional Certification Agency (LSP-P1) which has been licensed by the National Professional Certification Agency (BNSP) since 2018. So far, LSP-P1 Polban oversees 4 (four) Competency Test Places (TUK), namely Chemical Engineering TUK, Analyst Chemistry TUK, Refrigeration Engineering TUK, and Civil Engineering TUK. Each TUK organizes each certification scheme in accordance with the scope of its TUK. Each TUK has competency assessors who have also been certified by BNSP.

In 2019, the Equalization Program of Indonesian National Qualification Framework (KKNI) Level 4 was carried out at LSP-P1 Polban for vocational instructors who had more than 5 (five) years of work experience. They applied to the Level 4 KKNI Recognition Program for Past Learning (RPL) whose funding was supported by the Directorate General of Higher Education Institutions. The educational qualifications of teaching staff who were still at the high school level were increased so that their qualifications meet the qualifications of level 4 KKNI. Polban as one of the Vocational Higher Education in Bandung is obliged to meet the expectations of the Government and the expectations

of the human resources who are given the opportunity by the Government to obtain a more appropriate education in order to equalize their work experience, which deserves to be appreciated for its equality [4].

This program was then continued in 2020 with detailed understanding activities regarding the competence of heat exchanger operation and extraction as well as the competence of spectrophotometric and UV/Vis analysis at Chemical Engineering TUK and Chemical Analyst TUK, respectively [5]. Assessors who carry out the level 4 KKNi equivalency competency test feel obligated to truly transfer the understanding that must be possessed by the vocational teachers so that those holding the Level 4 KKNi really have the competencies in accordance with the targeted competencies.

The program was implemented as a Community Service Program for assessors who are also lecturers in the Department of Chemical Engineering Polban. The partner Vocational Schools invited to collaborate on this activity in 2020 is one of vocational schools (SMK) in Bandung.

In 2021 the Head of the SMK requested/proposed that the transfer of competency understanding, and increased insight be given to teachers by adjusting the competencies of teachers who are also assessors when carrying out student competency tests. The partner's current condition is that the SMK teachers have competence and have the authority to carry out competency tests for students in operating absorption, adsorption, distillation, evaporator, filtration, grinding and sizing equipment, heat exchangers, and simple ion exchangers. In addition to these competencies, one of the competencies required by the assessors who are also teachers of this SMK is the

competence to operate wastewater treatment and matters related to the dangers of its operation. This competency is one of the competencies that must be possessed and can complement the competencies already possessed by teachers in 4 (four) Study Programs at this SMK in Bandung [6].

The scheme for the operation of wastewater treatment is not yet owned by the Chemical Engineering TUK, but with this activity, a new scheme could be created, entitled Wastewater Treatment Scheme at the Chemical Engineering TUK. In terms of lecturers' expertise, there is no doubt that this Scheme can be realized as an addition to a new scheme in Chemical Engineering TUK. The courses that support the Wastewater Treatment Scheme that have been taught by senior lecturers of the Chemical Engineering Department are the Liquid Waste Management course and the Occupational Health and Safety course.

## 2. METHODS

The method of implementation of this study is shown in Figure 1. The steps of the activities in this figure can be described as follows:

### 2.1. Coordination and meeting with partners to synchronize problems

Such mentioned in the Introduction, the SMK teachers have competency and have the authority to carry out competency tests for their students in several competency subjects, but they have not possessed one competency subject of wastewater treatment. Therefore, coordination and meeting with the SMK teachers have to be conducted.

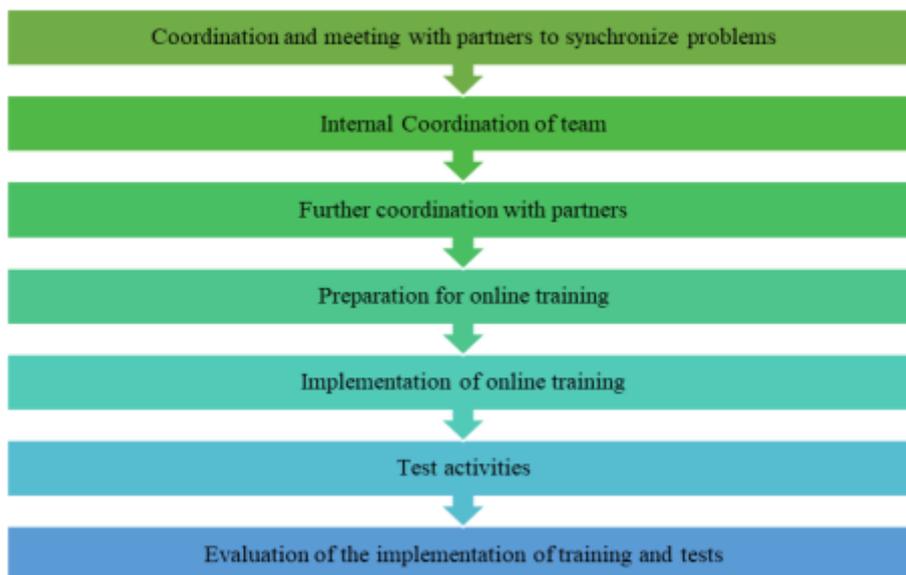


Figure. 1. Method of conducting the training

## 2.2. Internal Team Coordination

The results of coordination with this Senior High School were discussed in an internal meeting of the team, so that the steps to resolve this problem was obtained. The team consists of lecturers and assessors who were involved in equalization program of the level 4 KKNi for Instructors in 2019. Thus, training of theoretical and practical modules was given in accordance with the material and modules of the competency test [7].

## 2.3. Further coordination with partners

The solutions that have been formulated by the internal team were coordinated with this Senior High School regarding the implementation schedule, materials, and other related matters so that the planned activities can run well without significant obstacles due to the busy tasks of each participant as well as the lecturers and assessors conducting the training.

## 2.4. Preparation for online training

For the success of the training, the preparation of everything related to the online training must be carried out. The preparation process included compiling and distributing the modules, purchasing practical materials (chemicals) needed, and preparing the equipment used during videos making.

## 2.5. Implementation of online training

The training was carried out for 4 (four) modules in which each module has to be given for 8 (eight) hours of online training. The modules are identification of occupational safety and health hazards in wastewater treatment, chemical and physical wastewater treatment, biological wastewater treatment, and wastewater treatment plant maintenance.

## 2.6. Test activities

Two types of tests conducting during the training are pretest and posttest. By implementing the pretest, it can be seen whether participants have the experience or knowledge about the subjects that will be given during the training. The post test is conducted after the training subjects delivered. The purpose of the post test is to know whether the participants really understand the training subjects which has been explained by the trainers.

## 2.7. Evaluation of the implementation of training and tests

The entire implementation of training and tests that have been carried out are then evaluated to determine

their success. Participants are declared passed if they get a minimum score of 70 for each module.

## 3. RESULTS AND DISCUSSION

### 3.1. Coordination with Partners and Internal Coordination of the Team

Implementation of this study was started from coordination between the chairperson and members of the team and the partner (an SMK in Bandung), represented by the principal of this school and chief executive of activities. The meeting was welcomed and approved by the implementation of this activity. Even though the implementation of this activity took the time of the participants (the teachers at this school), the principal allowed the implementation of this activity since it was considered very useful in increasing the knowledge and skills needed by the teachers of this school.

**Table 1.** Training subjects delivered during the training

No	Training Subjects	Total Hours
1.	Initial Coordination of Training Implementation and Evaluation System	4
2.	Identification of Occupational Safety and Health Hazards in Wastewater Treatment	6
3.	Biological Wastewater Treatment	6
4.	Chemical and Physical Wastewater Treatment	6
5.	Wastewater Treatment Plant Maintenance	6
6	Presentation of Evaluation Results and Improvements	4

After obtaining the approval and support from principal of this SMK in Bandung, an internal coordination meeting was held by the team and the other experts in the team. The team and the experts were the assessors of the previous competency test, so the implementation of existing activities was part of the implementation of assessor's duties in providing the accession. Table 1 shows the training subjects delivered during the training.

### 3.2. Implementation of the Training

#### 3.2.1. Module 1 (Identification of Occupational Safety and Health Hazards in Wastewater Treatment)

Modules of training delivered are identification of occupational safety and health hazards in wastewater treatment (module 1), biological wastewater treatment

(module 2), chemical and physical wastewater treatment (module 3), and wastewater treatment plant maintenance (module 4). These four modules are the modules that must be studied to gain competency in the field of wastewater treatment

With detailed explanations of each module by the lecturers from the Department of Chemical Engineering Polban, an understanding of the theoretical background and related practical activities of each module was obtained. This is in accordance with the desired theoretical understanding when competency tests are carried out for each module in these four modules.

Figure 2 to Figure 5 show the results of competency tests for each module given during the online training. Each figure shows the standard score and the scores obtained during the tests, either pretest and post-test. Total number of participants is 20. P1 to P20 represent the participant 1 to participant 20.

As can be seen from Figure 2, participant who obtained the score of 100 during pretest only one person and who obtained the score of 80 is only one person too. The other participants obtained score less than the standard score of 70. One participant (P10) had internet network problems during the pretest was conducted so that he could not obtain the pretest score result. After the module 1 (Identification of Occupational Safety and Health Hazards in Wastewater Treatment) delivered, participants obtaining the score of 100 during post-test are 8 people. Participants obtaining the score of 80 during post-test are 9 people, the score of 70 are 2 people and only 1 participant got the score of 50. The participant who obtained the score of 50 had to do another test to get at least the score of 70 to enable her/him to be categorized as competent.

### 3.2.2. Module 2 (Biological Wastewater Treatment)

Module 2 of biological wastewater treatment is the module that has to be mastered by the participants in

obtaining competency in wastewater treatment. Figure 3 shows the results of pretest (before the module was given) and post-test (after the module was delivered). During pretest no one was able to get the score of 100, the highest score that was obtained is 80 which was obtained by 1 participant, only 4 participants obtained the score of 70, and the other participants got the scores under the standard score of 70, in which 2 participants got problem of internet network. However, after the module was explained, there were 8 participants got the score of 100, only 1 participant got the score of 50, and the others got the scores of 70 and above, except 1 participant who still could not overcome the internet network problem. The post test results which are satisfying was as a result of the module which was delivered was completed with the videos showing students conducting the practical activities.

### 3.2.3. Module 3 (Chemical and Physical Wastewater Treatment)

Figure 4 shows the results of pretest and post-test for the module of Chemical and Physical Wastewater Treatment. This module seems to be the module that most of the participants familiar with and understand even though the module has not been explained. This is shown by 2 participants obtained the score of 100, 3 participants obtained the score of 90, and 3 participants obtained the score of 80 (Figure. 4), meaning that 8 participants obtained the score above the standard score during pretest. After explanation of the module, none of the participant obtained the score under the standard score of 70. Moreover, the number of participants who obtained the score of 100 are 11 people. One participant who experienced internet network problem could even overcome the problem during the post-test and got the score of 80. Module 3 was also completed with the videos showing students conducting the practical activities.

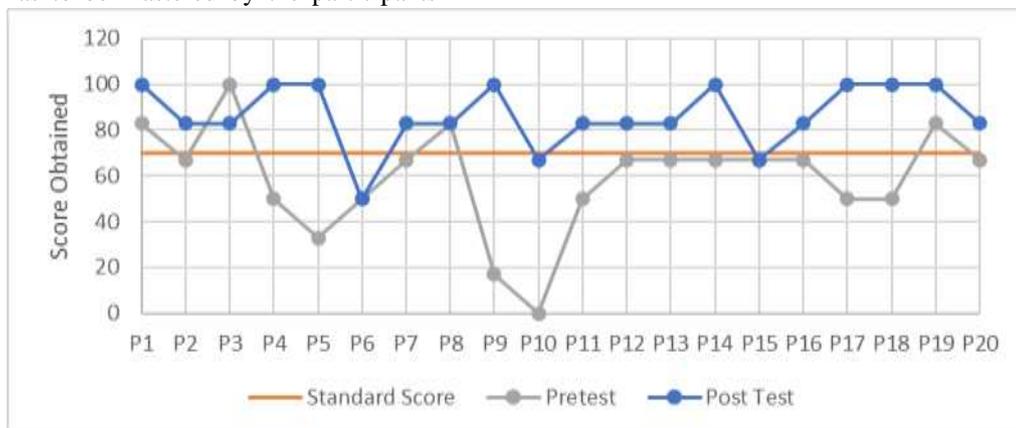


Figure. 2. Pre and Post Tests Results for Module 1

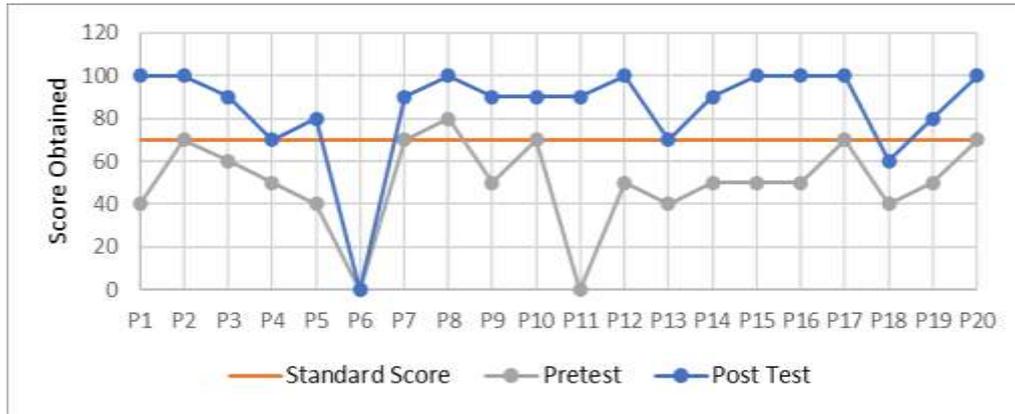


Figure 3. Pre and Post Tests Results for Module 2

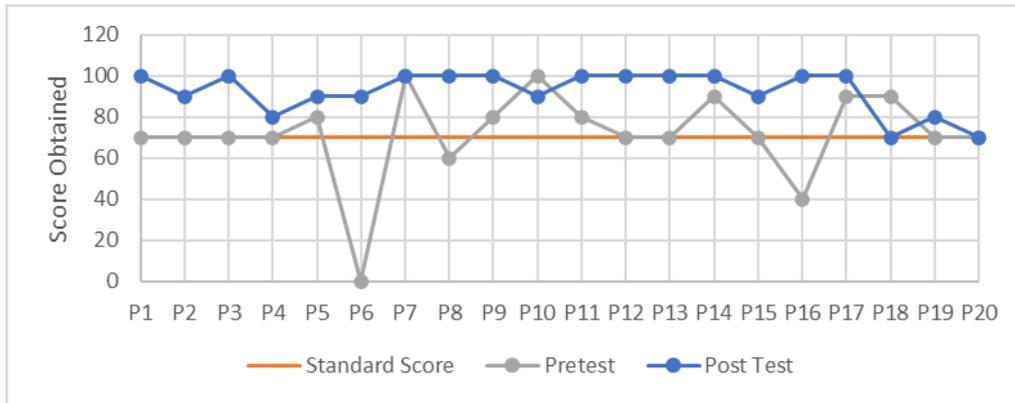


Figure 4. Pre and Post Tests Results for Module 3

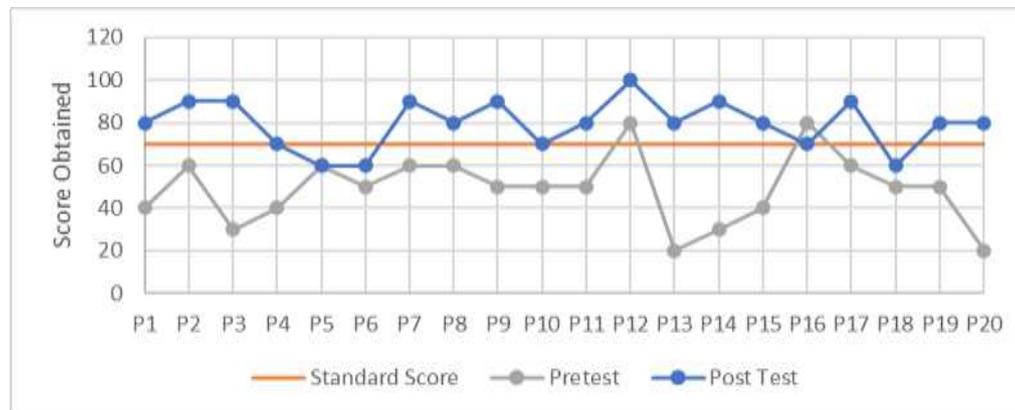


Figure 5. Pre and Post Tests Results for Module 4

### 3.3. Presentation of Evaluation Results and Improvements

As explained in 3.2, participants who have not got the scores equal to 70 had to undertake another test to classify them to become competent participants. From module 1, only 1 participant who had to do the repeated similar test. From module 2, only 1 participant who had to do the repeated similar test and another participant had to do the same repeated similar test since the participant could not overcome the problem of internet network problem during

pretest and post-test. None of participants had to do the repeated similar test for module 3. From module 4, three participants had to do the repeated similar tests since they got the scores below the standard score of 70.

Based on above explanation, it can be concluded that module 3, focusing on Chemical and Physical Wastewater Treatment is the most familiar module known by all participants. The most difficult or most unfamiliar module experienced by all participant is module 4, focusing on Wastewater Treatment Plant Maintenance.

#### 4. CONCLUSION AND SUGGESTION

All participants could obtain their competency in the wastewater treatment scheme by understanding the theoretical background and related practical activities for each module obtained during the training. The participants who haven't got the standard score had to take the repeated similar test until they are declared competent after successfully obtaining a score equal to or above the standard score of 70.

The four modules of training that have been delivered are not only beneficial for the partner but also beneficial for Polban. The Chemical Engineering TUK of Polban could prepare the scheme for the operation of wastewater treatment. For this reason, it was suggested that cooperation with the partner can be continued and can also be developed for cooperation in other fields. Therefore, the cooperation for both vocational education institutions can be realized in wider scopes in the fields that can be further collaborated.

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