

Cloud Computing Training for Vocational High School Teachers and Students in Purwakarta District

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ABSTRACT

Cloud computing has become a pervasive technology across various industries, with both established corporations and burgeoning start-ups transitioning from on-premises data centers to cloud services, making it one of the disruptive technologies in the ongoing digital transformation. In this era of disruptive digitalization, it is imperative for Vocational High School (SMK) students to continually improve their skills and knowledge to meet the dynamic demands of the job market, not only in the present but also in unpredictable times. However, the integration of cloud computing technology into SMK curricula has been unevenly executed. To address this gap, a community service program (PKM) was carried out with the primary objective of imparting cloud computing expertise to both vocational teachers and students in Purwakarta Regency. The methodology implemented in the PKM activities combined theoretical and practical elements within each training module. Amazon Web Service (AWS) was selected as the cloud computing service platform for its prominent market share and performance compared to similar platforms so that the benefits achieved from this training could be maximized. In the long run, it is hoped that cloud computing technology is successfully implemented in SMKs throughout the region.

Keywords : Cloud Computing, AWS, SMK, Purwakarta.

1. INTRODUCTION

One of the four pillars of Indonesia's vision for 2045 is human development and mastery of science and technology, better known as science and technology (**Ringkasan Eksekutif Visi Indonesia 2045, 2019**). In line with Indonesia's vision, an increase in science and technology education must be given evenly in this 4.0 industrial revolution era.

Cloud computing (CC) or cloud computing is a highly developed technology in the era of the Industrial Revolution 4.0. Unknowingly, CC-based services are often used in everyday life. Email services, online file storage, and business and customer service like e-commerce are also cloud-based (**Curtmola et al., 2014**). These several things show that the competency

challenges for the current workforce have been disrupted through technology. There will be more new types of jobs and jobs that will be lost.

According to BPS Indonesia, the workforce is residents aged 15 years and over (**BPS Kabupaten Purwakarta, 2018**). This means that the Indonesian workforce starts from the secondary level of education. Therefore, students at the secondary level of education must constantly improve competence and mastery of skills, especially in the field of science and technology, to face the demands of the world of work in the era of the Industrial Revolution 4.0 or in the unpredictable afterward. Therefore, it is necessary to strengthen students' competence at the secondary level of education through cloud computing training.

In addition, during the Covid-19 pandemic, most learning activities were carried out online. CC can also be a platform for learning media (**Al- Rasheedi & Khan, 2021; Nayar & Kumar, 2015; Singh & Mansotra, 2019**). Almost all fields of science can utilize CC as a learning medium, ranging from engineering, languages, and tourism to social sciences (**Mulyawan et al., 2020; Novianti et al., 2020; Yaroslav et al. Law University, Kharkiv, Ukraine, et al., 2019**). Given the high benefits of CC in learning, there are ten reasons why high school teachers (Higher Education Institutions: HEIs) should adopt CC in learning, as shown in Figure 1 below:



Figure 1. Reasons for adopting CC in secondary school learning (Qasem et al., 2019)

This CC technology is new, so most of the workforce (teachers and students) already uses CC but do not know how to build cloud-based services (**Fauzi et al., n.d.**). So, to help teachers adopt CC in learning, training activities are needed to increase teacher literacy related to CC technology.

This community service program targets students and teachers from secondary schools. For students, it is hoped that introducing this technology will strengthen their competence in the field of science and technology through strengthening cloud computing technology literacy so that they are better prepared to face the Industrial Revolution 4.0. For teachers, it is hoped that in line with the increase in teacher competence, the competence of their students will also

increase. In addition, it is hoped that teachers can implement CC technology in learning at school.

The Indonesian University of Education, Purwakarta Campus, has opened new non-educational study programs since 2019. However, not many people and stakeholders are aware of this. It is hoped that through this activity, the new image of the Indonesian University of Education, Purwakarta Regional Campus, as a campus that has pure engineering study programs, can be positively developed.

2. METHOD

The Implementation Phase is divided into three parts, namely:

1. Preparation, which includes the team carrying out participant target planning, correspondence, visits to schools, designing and manufacturing training modules, preparing the necessary tools and materials, preparing accounts to be used for practice, drawing up implementation agreements (IA) with schools, providing consumption and snacks as well as coordinating to prepare the rooms to be used.
2. Implementation: The implementation stages are divided into pre-activity, activity, and post-activity. At the pre-activity stage, all participants were given material theoretically. At the activity stage, participants are given theory and practice for 8 hours, guided by a team of instructors with a composition of far more practice than theory. During the implementation of the activity, participants work on all material according to the guidelines from the module that has been given. Participants work on two modules in the electronics laboratory room and two other modules in the wireless laboratory in parallel. All practices not completed during the activities and tasks were completed at the pre-activity stage, given two weeks. Each participant can still use the AWS account provided by the committee for practicum needs for two weeks while still being assisted by the instructor team if they experience difficulties.
3. Evaluation in the form of collecting responses from participants through a questionnaire.

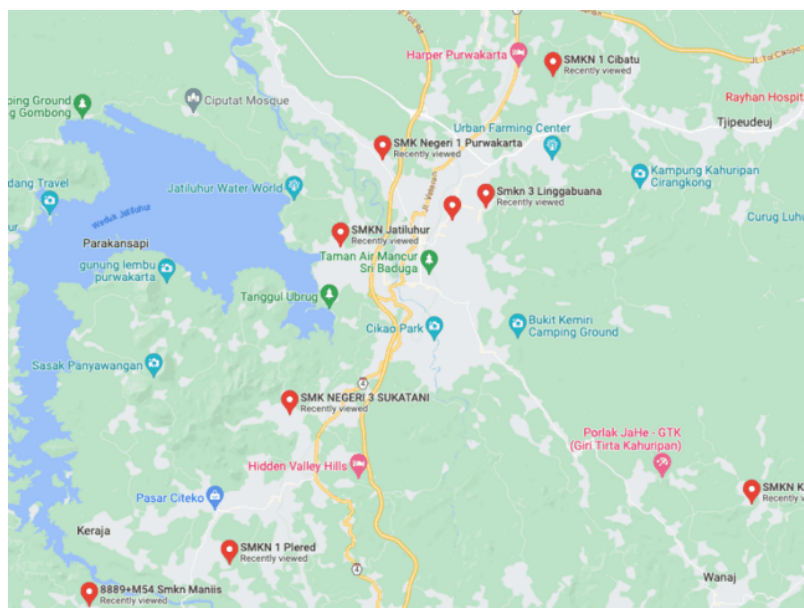


Figure 2. Map of Invited School Locations to the UPI Purwakarta area campus

This activity involved teachers and students of SMK majoring in computer and network engineering competencies in Purwakarta. This activity was attended by 11 teachers and 20 students from different high school levels and located in Purwakarta Regency, such as Purwakarta 1 Vocational School, Kiarapedes Vocational School, Jatiluhur Vocational School, Sukatani 3 Vocational School, Cibatu 1 Vocational School, Maniis Vocational School, Nur Syafai'il Ummah Vocational School, SMKN 1 Plered, SMKN 3 Linggabuana (Figure 2).

3. RESULT AND DISCUSSION

3.1 Implementation of Workshops

This workshop activity was implemented in the Smart School Room, Pancasila Building, UPI Purwakarta Regional Campus, Jl. Veteran No. 8, Nagri Kaler, Kec. Purwakarta, Purwakarta Regency, West Java 4115. The event is Wednesday, July 26, 2023, from 07.00 WIB to 15.00 WIB.

The program structure is divided into several stages: preparation, registration, opening, remarks, pretest, module one training session, ISHOMA, module two training session, posttest, and closing. Preparation and registration stage. Before starting the workshop, technical conditioning was held, and what needed to be prepared, such as equipment, workshop tools, consumption, and documentation.

1. Opening. The activity was opened with an MC and a prayer reading.
2. Remarks. The activity started at 07.00 WIB with remarks by the Head of the Galura Telecommunication Systems Study Program, Muhammad Suranegara, S.Pd., M.T (figure 3a). He gave a speech to the participants before starting the Pkm activities. In his remarks, he conveyed the intent and purpose of carrying out activities and reported on PkM activities, including increasing the competence of cloud computing technology for teachers and middle school students in Purwakarta.



(a) (b)
Figure 3. Workshop program documentation

3. Pretests. Participants Conduct a theoretical pretest to test the participants' abilities before carrying out the module practicum session.
4. Practicum session of module 1. Participants carry out activities with guidance from instructors who are students from the Telecommunication Systems Study Program (Figure 3b). In each session (both in session one and session 2), the teacher and

students are divided into two rooms, where in one room, four groups are working on different modules between the teacher and students. When the teacher works on module 1, and students work on module 2.

5. ISHOMA. ISHOMA stands for Breaking (Breaking), Prayer (Praying), and Lunch (Eating), where participants are given 1 hour 90 minutes to do ISHOMA and have lunch provided by the committee.
6. Module 2 practicum session. This activity continues the work on the next module. In the practicum session of module 1, the teacher is working on module 1, and then in session 2, the teacher is working on module 2. And vice versa with students.
7. Post-test. Participants completed a theoretical posttest to test their abilities after conducting a module practicum session (Figure 5a).



(a)



(b)

Figure 5a. Post-test and workshop closing documentation

8. Closing. After completing the posttest activities, participants were given a questionnaire containing questions related to participant satisfaction with the entire series of Pkm activities and given resume assignments and cloud computing workshop practicum assignments. Then, this activity was closed with a group photo (Figure 5b).

3.2 Evaluation of activities

After completing all training activities, the team evaluates all the necessary elements of this community service activity through a questionnaire (Zakaria et al., 2022). The questionnaire has two parts, the essay section and multiple-choice, for a qualitative and quantitative evaluation. Evaluation for a multiple-choice questionnaire uses a Likert scale of 1-5, with a score of one, which means strongly disagree, and a score of five, strongly agree. Of the 20 target participants, there were a total of 31 participants who attended, but the participants who filled out the questionnaire provided were 27 respondents. The composition of respondents is 63% students and 37% teachers. The results of the evaluation of the multiple-choice questionnaire are shown in table 1.

Based on the quantitative questionnaire assessment results in Table 1 point 8, 14.81% of respondents quite agreed, 33.33% agreed, and 51.85% strongly agreed that they were satisfied with the PKM activities that had been held. Based on these data, it means that 100% of activity participants are satisfied with the PKM activities that have been held.

Table 1. Results of the Questionnaire Assessment of PkM Activities

No	Question	Score				
		1	2	3	4	5
1	Will this activity give me new skills and knowledge about cloud computing?	0%	0%	11,11%	59,25%	29.62%
2	Is the material presented relevant to the guidelines in the module?	0%	0%	11,11%	55,55%	33,33%
3	Is this a valuable workshop for development in cloud computing technology?	0%	0%	22,22%	33,33%	44,44%
4	Does the instructor provide clear instructions during the training?	0%	0%	18,51%	37,03%	44,44%
5	Do you like the practice during the Cloud Computing workshop?	0%	0%	11,11%	48,14%	40,74%
6	After this training, I feel I can implement workshop materials for activities related to Computing technology	0%	0%	40,74%	44,44%	11,11%
7	Do you think the training program is well organized and easy to follow?	0%	0%	14,81%	44,44%	40,74%
8	Overall, are you satisfied with the Cloud Computing Workshop training activities?	0%	0%	14,81%	33,33%	51,85%

Essay questionnaire data represents qualitative data obtained from the participants' answers. Participants write down things they think are necessary but not included in the quantitative items. Some excerpts from the responses regarding cloud computing technology, the contribution of universities to schools, the overall content of the material, and the training facilitation of the participants are as follows:

- Cloud computing will be the future technology in the field of computing. That is because of the systems and mechanisms of cloud computing, where we do not need to spend significant investments to build infrastructure.
- Importance of Cloud Computing: Cloud computing has become integral to many organizations and industries. Many companies have turned to cloud solutions to store data, manage applications, and provide customer services.
- Cloud computing involves complex technologies, platforms, and services. For some people just starting, it can be a challenge to thoroughly understand the basic concepts, cloud architecture, and how each service works.
- Universities can collaborate with schools to design and develop cloud computing curricula appropriate for different education levels. This curriculum should cover the

basics of cloud computing, an introduction to crucial cloud technologies and services, and practical practices in managing and deploying cloud services.

- It is great fun, and the instructors are friendly.
- Very helpful for teachers on how to create digital books with attractive.
- Well facilitated with clean rooms, WiFi available, snacks and meals are also provided.
- The material for the modules provided by the supervisors was evident and exciting because the supervisors were friendly and patient with us students who did not know anything about cloud computing.

Based on the PkM team's review of the contents of the participants, this training activity had gone very well in terms of consumption (although there was no coffee break), friendliness and response from the instructor team, material content, and the usefulness of the activity.

Overall, the participants' suggestions were to provide positive things to PkM implementers, for example, the need for additional participants, the hope that the System Study Program would carry out more activities like this, additional time because one day is relatively short for teachers and students who are not from a computing/telecommunication background. Then, you need to add a coffee break. This is reasonable, due to budget factors so that consumption is only given twice, namely snacks in the morning and heavy meals during the day. However, it is appropriate that the PkM implementers also provide the afternoon program because this activity drains energy. One of the improvements was providing a backup microphone because it was one of the problems in this activity, even though it was carried out in a closed room.

We also evaluate the competencies possessed by participants before and after the activity using pre-tests and post-tests. Figure 7 and 8 are the pre-test and post-test results obtained from this activity:

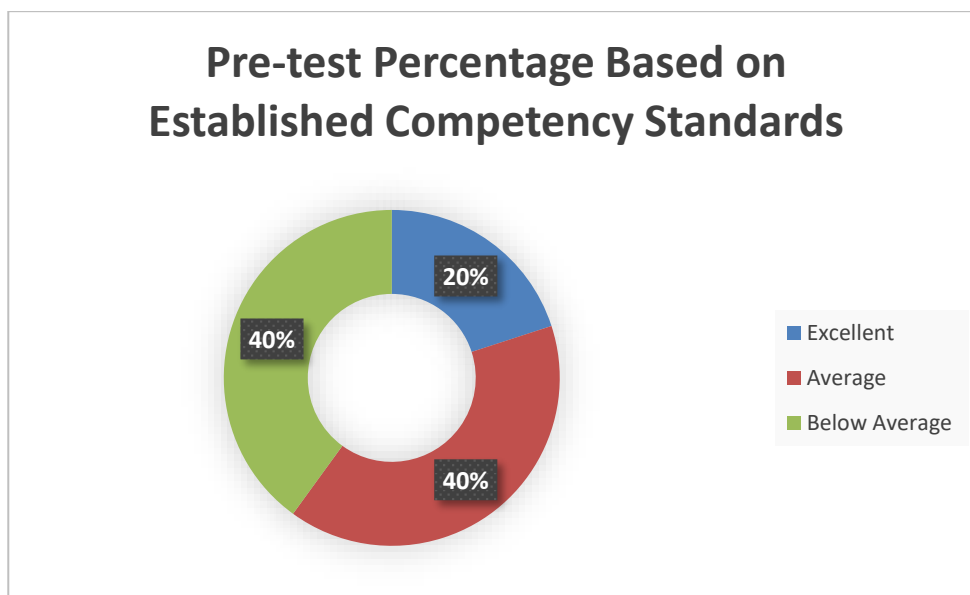


Figure 7. Pre-test Percentage Based on Established Competency Standards Graph

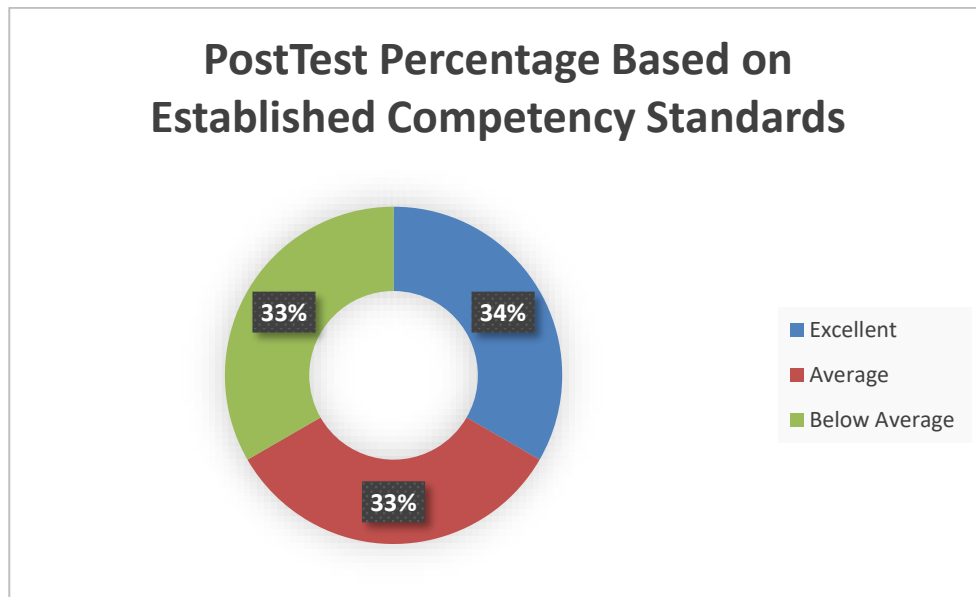


Figure 8. Post-test Percentage Based on Established Competency Standards Graph

The competency standards for this activity include three ranges: not satisfactory, satisfactory, and very satisfactory. Based on the data from the pre-test and post-test results, there was an increase of 14% in the excellent category, 7% in the average category, and a reduction in below average by 7%.

4. CONCLUSION

The activities of the Cloud Computing Training Program for Vocational High School Teachers and Students in Purwakarta Regency are the implementation of one of the Tri Dharma activities of higher education, namely community service (PkM). This activity was attended by 31 participants from teachers and students from 11 SMKs, both public and private SMKs, in the Purwakarta Regency environment. Based on the quantitative evaluation results, 100% of respondents agreed that this activity was going well overall.

If analyzed based on the usefulness of the activity, 100% of respondents agree that this activity is beneficial for developing their cloud computing competencies. In addition, support for content facilitation, such as instructors and modules, has also received good ratings and has even inspired teachers to develop digital modules. Nevertheless, based on a quantitative evaluation, several things that need to be considered in holding a similar event are the readiness of the microphone even if the activity is held in a closed room and the preparation of the time allocation for coffee breaks.

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