REKA ELKOMIKA: Jurnal Pengabdian kepada Masyarakat
ISSN(p): 2723-3235 | ISSN(e): 2723-3243 | Vol. 4 | No. 1 | Pages 34 - 44
DOI : https://doi.org/10.26760/rekaelkomika.v4i1.34-44 January 2023

Fiber Optic Splicing Testing Training for Vocational High School Students in Purwakarta

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Received 05 December 2022 **|** Revised 29 Desember 2022 **|** Accepted 05 January 2023

ABSTRACT

This activity aimed at improving the competence of SMK students in the fiber optic field that supports the development of broadband network technology in Indonesia. In addition, it was also to assist students in improving the basic competencies and core competencies of the Vocational High School curriculum for telecommunication access network engineering expertise. The activity was organized by the Telecommunication System Study Program at the Indonesian Education University Regional campus in Purwakarta, West Java in the Community Service (PkM) program. A total of 16 participants who were vocational students from several schools in Purwakarta Regency attended this activity. The method of implementing the workshop was the presentation of theory, practice, and evaluation by giving a questionnaire to the participants. The results of the participants' responses showed that they were satisfied with the implementation of this workshop (score 94.42 of 100).

Keywords*: test, splicing, optics, SMK students, Purwakarta.*

1. INTRODUCTION

Broadband is an internet term that refers to high-speed data transmission of Internet connections. International Telecommunication Union Standardization Sector (ITU-T) recommendation I.113 defines broadband as a transmission channel faster than the main ISDN speed at 1.5 to 2 Mbit/s. Fauzi **(2022)** explains that the fiber optic network is one of the broadband networks that has faster transmission speed than the copper cable network.

Fiber optic is a cable-like transmission line made of highly polished glass or plastic (120 micrometers in diameter, smaller than a human hair), used to transmit light signals from one place to another at an optimal speed **(Anonymous, 2017; Admin, 2018; Anonymous, 2020).** Fiber optic networks are known to have the advantage of providing better data transmission speeds compared to conventional cables. For this reason, the development of broadband networks **(Setyowati, 2021)** and optical communication continues to thrive up until now **(Fuada, 2017; Fauzi, 2022).** In addition, currently optical communication systems have also begun to be implemented under the sea **(Haryanto, Sujatmoko, & Hambali, 2019; Nugroho & Nugroho, 2022).**

Previous research has been done on fiber optic network transmission at Telecommunication operators, such as the splicing and measuring fiber optic cables at PT Telkom Kandatel Ternate **(Umaternate, Saifuddin, & Saman, 2016)**, analysis of calculation and measurement of fiber optic network transmission at PT Telkomsel **(Praja, Aryanta, & Lidyawati, 2013)**, and analysis of fiber optic cable splicing at Indosat **(Hanif & Arnaldy, 2017).**

The policy of the Purwakarta's regent in the 2018-2023 RPJMD or Rencana Pembangunan Jangka Menengah Daerah **(Bupati Purwakarta, 2019, p. 51)** regarding employment is to achieve highly competitive, professional, and dignified workforce towards a productive and prosperous Purwakarta society. Vocational High School (SMK) students are included as one of those workforces. Community service or PkM (Pengabdian kepada Masyarakat) programs that support students' knowledge and experience of technology have been done before, which is regarding the manufacture of RFID attendance machines **(Setyowati *et al.,* 2019).**

The expertise field of Network Computer Engineering or TKJ (Teknik Komputer Jaringan) in SMK curriculum is adjusted to prepare for the workforce, especially in the Telecommunication Access Network Engineering expertise, which includes core competencies and basic competencies, covering how to repair fiber optic networks. According to Setiawati *et al.* (**2015)** the factors that influence the learning achievement of vocational practice of vocational students include practical experience by 11.53%, teacher performance by 11.337%, and facilities and infrastructure by 14.89%. Apparently, facilities and infrastructure also contribute to student learning achievement. However, there are still limited facilities and infrastructure at the field of fiber optics on several vocational schools in Purwakarta.

For this reason, the authors from the Telecommunication Systems Study Program conducted the program of fiber optic splicing test workshop to help TKJ Vocational School students in Purwakarta to improve the basic competencies and core competencies covered in the curriculum of Vocational High Schools in Purwakarta, especially telecommunications access network engineering expertise. In addition, the program also aimed at increasing the acceleration of adaptation to curriculum changes so that students have better competence in the field of fiber optic.

2. METHODS

The implementation stage was divided into three parts, which were:

1) Preparation, which included an initial coordination meeting, determining the number of participants and schools invited, determining the date and place of the workshop, designing certificates and banners, as well as making and distributing invitation letters to schools.
2) Implementation, which was the realization of the plan.
3) Evaluation in form of gathering responses from participants through questionnaires.

Table 1 below is a list of questions contained in the questionnaire spread to the participants after the program and before leaving the room.

Table 1. List of Participants Questionnaire Questions

No.	Question	Excellent	Good	Fair	Poor	Very poor
Content						
1.	The lesson is well organized and easy to understand					
2.	The lesson is very relevant and has met my needs to support my skills in testing fiber optic connection for the splicing results.					
3.	the lesson is sufficient for me to be able to test fiber optic connection					
4.	Because of the lesson, it will be easier for me to conduct fiber optic splicing test					
Delivering/Presentation of the Lesson						
5.	The presenters have a good understanding of the lesson presented					
6.	Time allocation for the presentation					
7.	The speaker presented the content well; easy to understand and implement					
Discussion/Q&A						
8.	Allocation of discussion time to increase/strengthen understanding					
9.	Presenters answered participants' questions clearly					
10.	Overall, the discussion/Q&A had been very helpful in improving participants' understanding					
Workshop Facilities and Infrastructure						
11.	Workshop room facilities					
12.	Consumption provided					
13.	Easily accessible workshop location					
14.	Audio visual devices meeting the workshop needs					
15.	Availability of prayers room and toilet					
Write down any suggestions for improving the workshop						

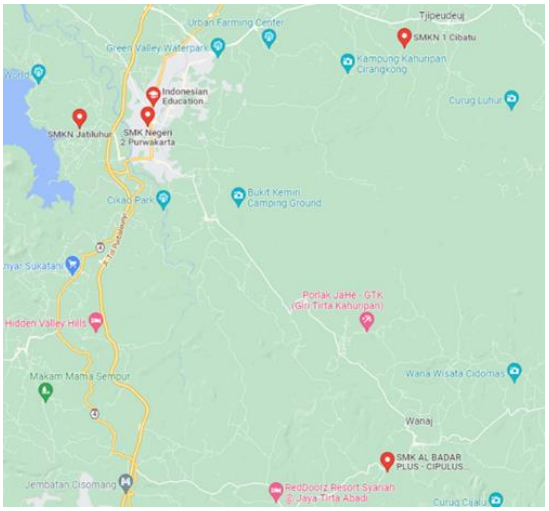

Figure 1. Location Map of Invited Schools to UPI Purwakarta Campus

This activity involved vocational students with TKJ competency major in Purwakarta. Due to limited resources, the participants were limited to 18 students from several vocational schools in Purwakarta, such as SMKN 2 Purwakarta, SMKN 1 Cibatu, SMKN Jatiluhur, and SMK Al-Badar. The four schools are located around the UPI Purwakarta campus, as shown in Figure 1. The place of implementation of the activity was the UPI Purwakarta Campus so that participants could easily access the activity site.

3. RESULT AND DISCUSSION

3.1 Workshop Implementation

This workshop activity was held in the Smart Classroom, Gedung Perkuliahan Baru, UPI Purwakarta Campus, Jl. Veteran No.8, Nagri Kaler, Kec. Purwakarta, Purwakarta Regency, West Java 41115, West Java. The time for the program was Sunday, August 21st of 2022 starting at 08.00 to 15.00 WIB. The details of the activities can be seen in Table 2.

The structure of the program was divided into several stages, such as preparation and registration, opening, welcoming speech, theory presentation, network implementation demo, coffee break, module practice session 1, ISHOMA, module practice session 2, closing.

1) Preparation and registration stage. Before starting the workshop, a briefing was held regarding technicalities and what should be prepared such as events, equipment, workshop tools, documentation, and consumption for participants and organizers.
2) Opening. The activity began with the recitation of the holy verses of Alqur'an.
3) Remarks. The activity began at 08.00 WIB with a speech by the Head of the Telecommunication Systems Study Program, Ahmad Fauzi, S.Si., M.T., (Figure 2). He gave a speech to the participants before starting the PkM activity. In his remarks, he conveyed the purpose and objectives of the implementation of this PkM activity, one of which was to improve the competence of vocational students in the field of fiber optic.

Figure 2. Documentation of the remarks

4) Theory presentation. Futhermore, a brief presentation on fiber optic was given by Endah Setyowati, S.T., M. T. as shown in figure 3.

Figure 3. Documentation of the presentation

This initial briefing is very important so that the participants recognize and understand the practices in this community service program. The introductory fiber optic material provided is about basic knowledge of fiber optic, types of fiber optic to the advantages and disadvantages of fiber optic. But before that, participants were asked to fill out a pretest containing questions related to the basic introduction to fiber optics. The goal was to find out how far the students' knowledge of fiber optic before being given this workshop.

5) Network implementation demo. This activity was conducted to provide insight to students regarding fiber optic network implementation.
6) Coffee break. In this session, participants were given a snack box containing 5 kinds of various cakes.
7) Practical session 1 was conducted by participants with the guidance of instructors who were students from the Sistel Study Program. In each session (both session 1 and session 2), there were 4 groups working on 2 different modules. When group A and B practiced module 1, group C and D worked on module 2. Documentation of practice activities can be seen in figure 4.

Figure 1. Documentation of the practical activities

8) ISHOMA. ISHOMA stands for Breaking (Istirahat), Praying (Sholat), and Lunch (Makan) when participants were given 1 hour and had lunch before leaving the room for ISHOMA.
9) In this second session, participants who had done module 1 practice would work on module 2 practice activities. Vice versa, for groups of participants who had done module 2 practice, then in this second session worked on module 1.

10) Closing. After completing the practical activities, SMK students were given post-test questions to test their abilities after carrying out practical activities. In addition, students were also given a questionnaire containing questions related to participant satisfaction towards the entire series of PkM activities. Then, this activity was closed by giving certificates to participants (Figure 5) and continued with a group photo as shown in Figure 6 below.

Figure 5. Awarding certificates to participants

Figure 6. Photo of participants and organizers after the activity

3.2 Activity Evaluation

To determine the participants' response to the workshop activities, participants were given a questionnaire at the end of the event. With this evaluation form, program implementers got two types of quantitative data. There are 15 (fifteen) questions in the questionnaire where the answers only contain numbers, namely scale 1 (one) to scale 5 (five) with the following information: scale 1 = very poor, scale 2 = poor, scale 3 = fair, scale 4 = good, 5 = excellent. The closed questionnaire covered 4 (three) main aspects, namely content, conveyance/presentation of the lesson, discussion/Q&A, as well as workshop facilities and infrastructure. For quantitative data, the percentage calculation refers to paper [5], shown in equation (1). The number of participants was 24 people, so the maximum value if all participants answered score 4 was 96 or the maximum percentage of 100%. Meanwhile, the total score obtained depends on the participants' entries. If all participants gave a score of 1, the lowest number would be 24 or a minimum percentage of 25%. The difference between the maximum percentage and the minimum percentage is 75%.

$$\frac{total\ value\ obtained}{total\ maximum\ value}\ x\ 100\% \quad (1)$$

The organizers used five levels (1 to 5) as previously described, thus the interval class was also divided into five levels. The conversion results as well as the satisfaction level are shown in Table 2.

Table 2. Participants' level of satisfaction with the implementation of activities

No.	Percentage	Description
1.	80.01 % - 100%	Excellent
2.	60.01 % - 80.00 %	Good
3.	40.01 % - 60.00 %	Fair
4.	20.01 %- 40.00 %	Poor
5.	0 % - 20.00 %	Very Poor

The following are the results of questionnaires filled out by participants. Figure 7 below is the result of the participants' response to the material content.

Figure 7. Graph of Participants' Response to the Content of Workshop Materials in Bahasa Indonesia

Overall, the participants were satisfied by giving a very good assessment of the content of the workshop materials, namely 91. With a score of 96.25, on the question of material that is organized and easy to understand, meaning that participants are very satisfied with it. A score of 92.50 regarding the material is very relevant and has been in accordance with the needs of the participants to support the skills in testing the results of fiber optic connections from the participants, meaning that the participants are very satisfied. Then the participants felt that the material was sufficient for the participants to be able to conduct excellent fiber optic connection testing, marked with a score of 85. The participants also strongly agreed with a score of 90 that the workshop and practice materials provided would make it easier for participants to conduct fiber optic connection tests. Furthermore, Figure 8 below shows a graph of participants' responses to the material delivery.

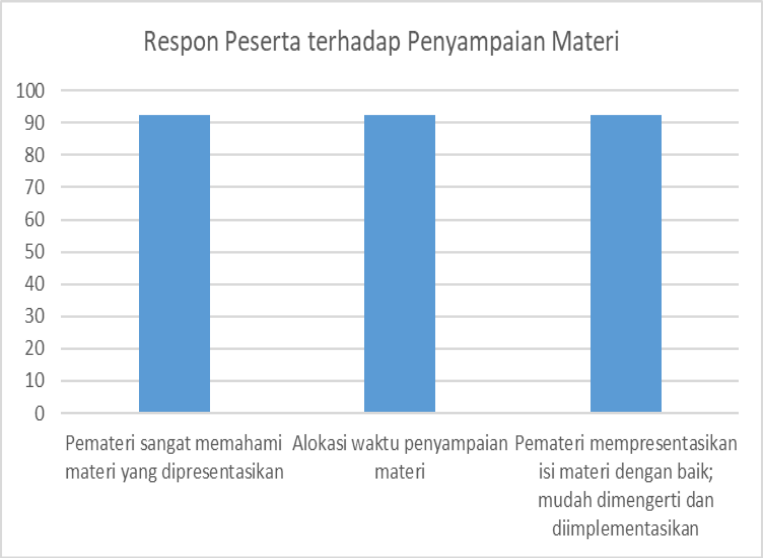

Figure 8. Graph of participants' response to material delivery in Bahasa Indonesia

The delivery of the material was considered very good by the participants regarding the understanding of the material presented, which can be seen from the gained score of 92.50. The time allocation for delivering the material was very appropriate according to the participants, as evidenced by the assessment results of 92.50. Participants also felt that the presenters presented the content of the material very well, easy to understand, and implemented with a score of 92.50. Overall, participants felt that the delivery of the material was very good with an overall average score of 92.50. The graph of participants' responses to discussions and questions and answers can be seen in Figure 9.

Figure 9. Graph of participants' response to discussion/Q&A in Bahasa Indonesia

Overall, participants' response to the discussion/Q&A was very good with a score of 96.25. Participants rated the allocation of discussion time to increase/strengthen participants' understanding very well, indicated by an average score of 95.00 given by all participants. Then the presenters were very good at providing answers to participants' questions clearly with a score of 98.75. In addition, participants were also very satisfied and agreed that the discussion/question and answer session in this workshop was very helpful in improving participants' understanding, with a score of 95.00. Participants' responses regarding facilities and infrastructure can be seen in Figure 10.

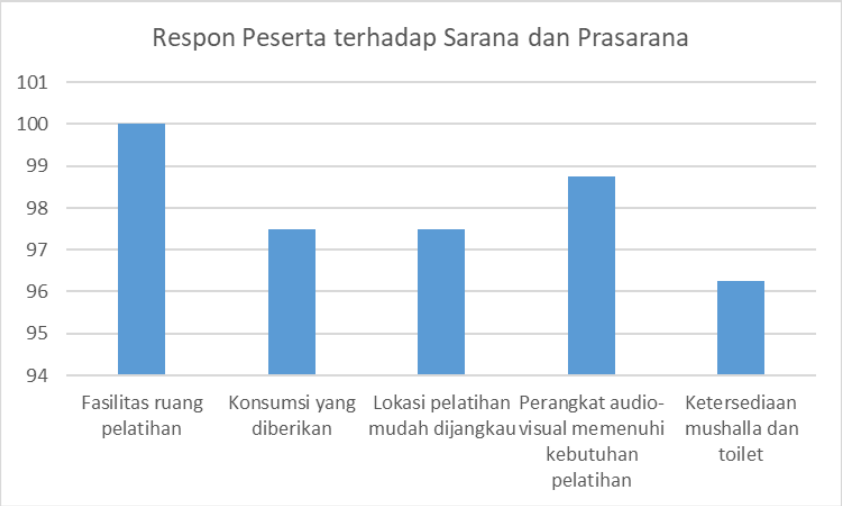

Figure 10. Graph of participants' responses to Facilities and Infrastructure in Bahasa Indonesia

Overall, participants' responses to the facilities and infrastructure were very good with a score of 98.00. This was supported by the workshop room facilities which received a rating of 100 from the participants, meaning that all participants gave very good scores for the workshop room facilities. Then, the consumption provided received a very good assessment with a score of 97.50. In addition, the workshop location was considered easy to reach by the workshop participants with an assessment of 98.75. The availability of prayer rooms and toilets also received a very good assessment from participants with a score of 98.00. In addition, Table 3 below shows the participants' responses regarding suggestions for improving the workshop. Almost all participants gave positive suggestions. Assessed that the entire series of implementation of this workshop has gone well.

Table 3. Participant Response (Suggestions for Improving the Workshop) in Bahasa Indonesia

Respon Peserta terkait saran untuk perbaikan pelatihan
tidak ada karna, pelatihan ini sangat baik dan mudah di pahami
TETAP MENJADI KAMPUS YANG TERBAIK DI PURWAKARTA
Tidak ada
Semua sudah sangat baik
Semoga Ada lagi Pelatihan pelatihan yang lain nya, agar dapat menambah wawasan kami lagi
Semuanya sudah sangat baik
Lebih dari cukup kak
Tidak ada saya cukup memahami pelatihan yang diajarkan
Udah bagus banget, kakak-kakaknya juga ramah sekali
Saran nya adalah mudah di mengerti dan menyenangkan 😁
Tidak ada. Sejauh ini semua yang dilakukan panitia sangat baik. Terima kasih untuk seluruh panitia yang sudah memberikan materi kepada kami.
Tidak ada, sudah memuaskan
sudah sangat baik
so far so good
Pada saat awal-awal kurang menarik, tapi gapapa udah bagus kok

4. CONCLUSIONS

The fiber optic splicing test workshop activity for vocational students in Purwakarta has been carried out well, starting from preparation, implementation, to the evaluation process. The workshop topic chosen was fiber optic connection test. The participants consisted of 4 schools, namely SMKN 2 Purwakarta, SMKN 1 Cibatu, SMKN Jatiluhur, and SMK Al-Badar. Initially, 18 participants were invited, but two students were unable to attend without confirmation. Participants were given materials first before starting the practicum. Then after the event, they were given a satisfaction questionnaire. The results of the participants' responses showed that they were satisfied with the implementation of this workshop (score 94.42). In addition, almost all participants gave positive responses, one of which said that they hoped that other workshop activities like this could be held again because it helped them add insight. In addition, the author hopes to be able to carry out workshop like this again in the future with different themes that can improve skills that support students' majors at school.

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