Assisting the Installation of Wireless Network Devices at Bina Tani Mulya Al-Muhajidin Boarding School

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ABSTRACT

The rapid development of Information and Communication Technology (ICT) can be utilized to improve the quality of services in the world of education. Bina Tani Mulya Al Mujahidin Foundation Boarding School Junior High School (YBTMA) previously did not have ICT infrastructure, especially hotspot or access point services. Based on this, it was necessary to provide assistance to design the installation of Microtik hotspot and access point devices, as well as human resource training to use and maintain these devices so that they could be utilized as much as possible. The installation of hotspot devices and access points was carried out on November 9, 2019, while the training was carried out on November 16-17 2019. This program received positive responses from the program recipients. Our strategy of deploying internet access supporting tools, which was then followed by a briefing of theory and practice, was well received.

Keywords: *education, ICT infrastructure, Microtik access point, hotspot, training*

1. INTRODUCTION

With the ubiquitous use of information and communication technology in any aspect of social activities, the implementation of the technology in educational sector is a natural trend and can help any institution increase its service to its stakeholders, including: students, teachers, and staffs. Several efforts have been made to apply ICT to improve services in the education sector. The paper by (**Santoso, 2012**) reported the results of a comparison of the use of wired and wireless media in computer network installations at educational institutions with the conclusion that there is a tendency to use wireless media, because of the ease of installation and its flexibility. Papers by (**Tjahjono, 2016**) and (**N.M.A.E.D. Wirastuti, 2016**) described the process of implementing LAN networks in several educational institutions. Other works by (**Musdalifa, 2019**) and (**Mukti, 2019**) reported the use of the Mikrotik device as the main device in the installation of wired and wireless-based internet networks in educational institutions.

The Bina Tanimulya Al-Mujahidin Foundation (YBTMA), located in Tanimulya Village, Ngamprah District, West Bandung Regency, was established on 2 October 2015. The

objectives of this foundation is to conduct social, religious and humanity activities. In addition, the Foundation is also building a Yunior High School (**Yayasan, 2015**). This school is currently under construction as shown in Figure 1. At the time of observation, it was found that the school did not have ICT infrastructure, especially hotspot services or access points to support teaching and learning activities for students, teachers and school employees.

Figure 1. The process of building the YBTMA Boarding School.

Under the grant from Community Service Program, Bandung State Polytechnic, we proposed a collaboration with the YBTMA Foundation for Assistance in Internet and Computer Network Development at the YBTMA Boarding School Junior High School. The solution proposed in this program is to install hotspot devices at several strategic points in and around the YBTMA Boarding School Junior High School, as well as to provide training to teachers, employees, and technicians who will manage the hotspot devices so that they can later use and maintain the hotspot devices. The availability of hotspot devices at the Boarding School Junior High School makes teachers, students, employees, and the entire school community able to enjoy internet access wherever they are within the hotspot area without having to use cables.

2. METHOD

The activity began with a coordination meeting between our team and the Foundation which was held on February 20, 2019 and continued on June 23, 2019 regarding the plan to (a) identify the spots where the hotspot devices would be installed, and (b) provide training activities as well as materials that were tailored to the initial competencies of participants and the expectations of the Foundation regarding the knowledge to be delivered to the prospective participants.

As a response for agreement (a), on November 9, 2019, 1 Microtik router and 3 TPlink access-points were installed at several points within the YBMTA Boarding School Junior High School. Figure 2 shows some camera shots of the installation of these devices and Figure 3 illustrates the locations of the installed devices.

In relation to the preparation of training materials (agreement (b)), the material for training course was suggested to contain network planning, installation and operation techniques of

computer and internet as follows: (a) Designing a network topology according to the condition of the building, (b) Creating number of network nodes (hosts) for users, (c) Creating a class or network address segment for the large number of nodes (host) network, (d) Assigning network addresses to network nodes or devices, (e) Recording the address of each network node or device, (f) Determining the network topology that required new devices, (g) Making a list of network devices and their capacity design, (h) Preparing computer devices to be connected to the network, and (i) Determining the capacity value that could be fulfilled by several vendors.

Figure 2. Installation of hotspot and access points

Based on the above subject requirements, we developed training materials extracted from various sources such as (**Daimi, 2018)**, (**Forouzan Behrouz, 2003**), (**Gilbert, 2001**), (**Ibe, 2018**), (**Ray, 2007**), and (**Regelio, 2008**). In detail, we have specifically written the following materials:
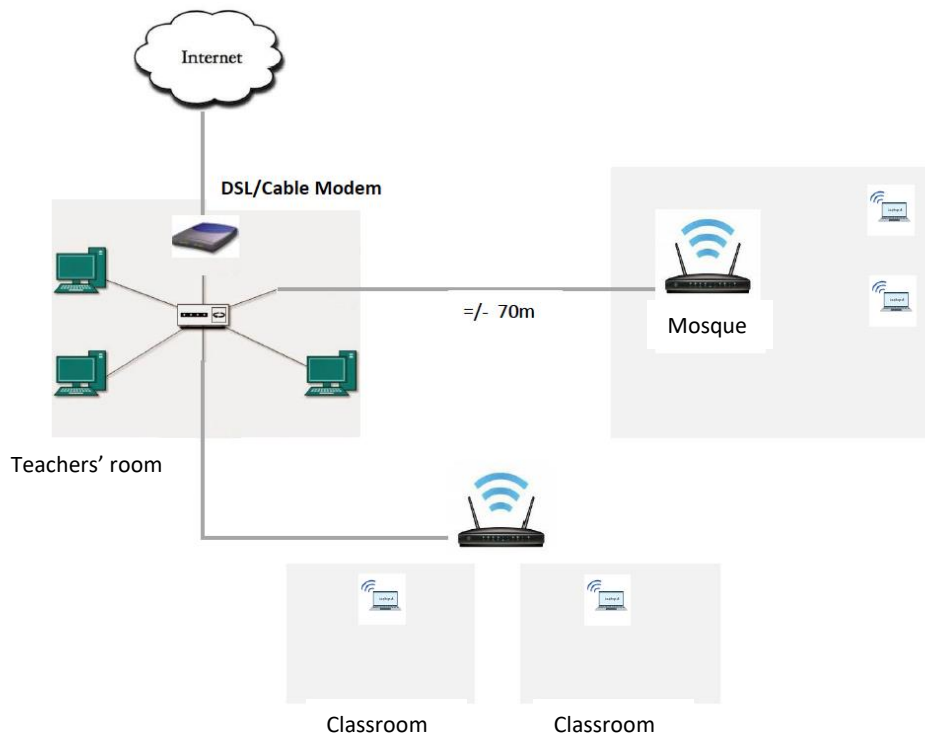
(a) Network Topology

This training material facilitates the formation of competence in designing computer network topologies. The course includes computer network, network devices, network topology, and network planning.

(b) Network Technical Requirements

This training material facilitates the formation of competence in determining the technical needs of network users and maintenance technicians. The course includes introduction of

physical network components, logic component of network, and writing document of technical needs of network users.

Figure 3. Installation of network devices

(c) The Determination of Network Device Specifications
This training material facilitates the formation of competence in determining the specifications of network devices. The course includes how to determine specifications for devices such as: Computer (PC), Network Interface Card (NIC), Modem, Cable, Connector, Hub, Switch, Repeaters, Bridge, Router, and Access Point.
(d) Designing Network Addressing
This training material facilitates the formation of competence in designing computer network addressing. The course includes IP Address version 4, Subnetting, and Variable Length Subnet Masking
(e) Installing a Wireless Network
This course facilitates the formation of competence in setting up a wireless network. The course includes wireless network specification, wireless network topology and stages of installation of a wireless network (infrastructure)
(f) Introduction to Mikrotik Hotspot
This course facilitates the formation of competence in setting up a Mikrotik Hotspot. The course includes setting up the Mikrotik Hotspot as DHCP server, used to provide automatic IP services to users, Firewall NAT, to translate user IP to IP that can be recognized to the internet, Firewall filter, to block users who have not logged in, Proxy, to provide a log-in page view, and DNS Servers.

Before launching the training, the selection process was carried out by the manager of the Foundation, accompanied by our team. The process was aimed at anticipating the amount of participants so that the numbers did not exceed seat capacity and at making the provision of training materials more effective, because for this training, the participants should at least have background knowledge of electricity and electronic. In fact, the selection process was

not too difficult because the candidate participants were those who were usually given the task to operate and maintain internet and computer networks in the school. There are 20 participants from various backgrounds, i.e: 10 employees, 3 students, 3 teachers, and 4 local residents.

(a)   (b)

Figure 4. Training Activities (a) Open speech by the Head of Tani Mulya municipal village (b) Participants

On 16-17 November 2019, the training was carried out. On day one, the training was opened by the Head of Tani Mulya municipal village (Figure 4.a) and fully attended by all participants (Figure 4.b). After the training had been opened, one of us (Mr. Utomo) delivered the theoretical materials (Figure 5). The first day ran successfully and all participants followed the class with full attention.

Figure 5. Theoretical class

On day two, Mr. Usman supervised the practical class. The same participants attended and followed the class with full attention (Figure 6). The class ran successfully without any disruption.

During the class sessions, the participants were also given the following topics:
1. Identification of the problems and difficult issues found during the sessions.
2. Explanation on how to analyze the problems and solutions along with other technical reasons.
3. Carrying out network devices installation around the site with real hands-on experience.

4. Carrying out technical testing with testing tools and if there were problems, found a solution based on conditions in the field.
5. Making documentation of the computer network topology based on: (a) physical/building/ field conditions, and (b) Internet Protocol (IP) addresses

Figure 6. Practical class

3. RESULTS AND DISCUSSION

After the training process was completed, we distributed questionnaires to get responses from the participants. The questions are directly related to the programs as follows:
1. Difficulty level of theoretical material (scale 1-5).
2. Difficulty level of practicum (which is held after lectures (scale 1-5)
3. The usability of the installed devices (scale 1-5)
4. Overall program benefit (scale 1-5).

From the results of distributing questionnaires, we received input as many as 20 sheets from all participants. Table 1 shows the results of the questionnaires.

Table 1. Results of the questionnaires

Statistics	Question 1	Question 2	Question 3	Question 4
Average	3.15	4.55	4.75	4.30
Standard Deviation	0.75	0.60	0.55	1.03

From Table 1, it can be concluded that our strategy of providing theoretical material first, followed by practical training, received positive responses from participants. It is demonstrated from the distribution of their answers which increase, from 3.15 in Question no. 1 to 4.55 in Question no. 2. They also gave positive appreciation for the devices we installed to support this mentoring program (Score 4.75). However, there are varied answers

to the overall benefit of this program, although it remains in a positive direction (4.30). We guess that the background of the participants is the possible cause.

We also gave open questions about their impressions of the training. A total of 10 participants (50%) stated that this program was very useful and increased their knowledge of internet support device installation techniques. Some of them hoped that there would be other programs. A total of 7 participants (35%) complained that the training time was too short, stating that the age factor (50 years and over) was the cause of their slow absorption of new knowledge.

(a)   (b)

Figure 7 (a) Handover of the equipment (b) Camera shot after the training.

Figure 7(a) shows the handover of installed equipment from our team to representatives of YBMTA Boarding School Junior High School and Figure 7(b) shows a group photo at the closing of the training.

4. CONCLUSIONS

From the results of the questionnaires, it can be concluded that the assistance program for the installation of wireless network equipment in the YBTMA Junior High School received a positive response from the program recipients. Our strategy of deploying internet access supporting devices, which was then followed by a delivery of theory and practice, was well received. They also gave positive response about the benefit of the program, which was reflected in their responses to questions no. 3 and 4. Several complaints about the lack of training time became a record for us to improve the strategy of delivering material in the future, especially when the participants are not young.

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