Socialization of Microcontroller use in Medical Support Equipment for Indonesian Electromedical Students

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Abstract. Socialization of Microcontroller Use in Medical Support Equipment for Electromedical Students undertaken by the Muhammadiyah Aceh School of Health Sciences. The project aims to enhance the understanding and skills of students in using microcontrollers for medical devices, thereby improving healthcare support in the community. Through a series of webinars, the initiative addressed critical issues related to the utilization of microcontrollers in the design and maintenance of medical equipment. The target audience included electromedical students from various campuses in Sumatra, emphasizing the integration of theoretical knowledge with practical applications. The results indicated significant improvements in participants' knowledge and skills, highlighting the importance of such programs in fostering technological advancements in the healthcare sector. This initiative not only contributes to the educational development of students but also plays a crucial role in enhancing healthcare service delivery.

Keywords: Equipment, Healthcare, Medical

1 Introduction

Higher education institutions are mandated to conduct research and community service as stipulated in the Higher Education Law No. 12 of 2012, which emphasizes the role of the academic community in applying and disseminating knowledge and technology to enhance public welfare and intellectual life. This mandate aligns with the Tri Dharma of Higher Education, which encompasses education, research, and community service. Consequently, academic institutions are expected to empower faculty members to contribute meaningfully to society through the dissemination of knowledge and skills, particularly in their areas of expertise [1].

The Department of Electromedical Technology at the Muhammadiyah Aceh School of Health Sciences recognizes the critical need for proficient healthcare professionals and advanced medical equipment to improve public health outcomes. In response, the department has implemented an annual community service program, which includes activities such as webinars to educate and train students on the use of microcontrollers in medical devices. Some of the webinars conducted have the purpose of disseminating information and knowledge to the public. This initiative aims to bridge the gap between theoretical knowledge and practical application, thereby enhancing the students' competencies in medical technology and improving their ability to contribute to healthcare facilities [2] [3].

As the healthcare industry undergoes rapid technological advancements, the demand for skilled professionals who can operate and maintain medical devices becomes increasingly vital. The integration of microcontrollers in medical equipment is one such advancement that has gained prominence, necessitating a focused effort to equip students with the necessary skills and knowledge. This report outlines the activities and outcomes of the "Socialization of Microcontroller Use in Medical Support Equipment for Electromedical Students" project, which seeks to address these educational and practical needs [4] [5] [6] [7].

2 Methods

This community service project was designed to enhance the knowledge and skills of electromedical students in using microcontrollers for medical support equipment. The target audience for the project consisted

of electromedical students, particularly those affiliated with the Indonesian Electromedical Students Association and representatives from campuses in the Sumatra region [8] [9] [10].

2.1 Target Audience

The participants were students of electromedical studies, selected to ensure a focused and relevant training experience. The primary goal was to equip these students with practical skills in microcontroller programming and its application in medical devices, a crucial competency for their future professional roles.

2.2 Activity Structure

The project was executed through a series of online seminars (webinars) and demonstrations, divided into the following phases:
   a. Lectures
      1. Introduction to the Diploma Three Electromedical Technology Program at STIKes Muhammadiyah Aceh.
      2. Overview of microcontroller technology, including an introduction to its components, both hardware and software.
   b. Demonstrations
      1. Practical sessions demonstrating the use of microcontrollers in medical support equipment, delivered via online simulation tools.
   c. Discussion and Evaluation
      1. Interactive sessions where participants could ask questions and discuss the applications of microcontroller technology in their field.
      2. Evaluation of the participants' understanding and feedback on the effectiveness of the training.

2.3 Supporting and Inhibiting Factors

The success of the project was influenced by several factors:
   a. Supporting Factors
      1. Availability of qualified experts to deliver the content.
      2. High enthusiasm among the participants.
      3. Support from the leadership of STIKes Muhammadiyah Aceh, including financial backing for the project.
   b. Inhibiting Factors
      1. Intermittent internet connectivity issues.
      2. Limited time for in-depth training.
      3. Varied levels of participant understanding and engagement.

2.4 Timeline

The activities were conducted on May 11, 2024, using an online platform to reach a broad audience. The structured agenda included opening remarks, three main instructional sessions, and a closing discussion.

2.5 Budget

The project budget covered various costs, including application fees for the webinar platform, design and creation of e-certificates, and other administrative expenses. The total expenditure was approximately Rp 2,160,000.

3 Results and Dicussion

This community service activity is carried out online. Before the event takes place the committee holds a meeting to determine the schedule, form of activity, place, agenda, series of activities. After agreeing on the form of activity, flyers are prepared to convey information about the event. In Figure 1 below is the flyer that is being circulated.

Figure 1. Community Service Flyer

Before the event starts, the committee prepares cameras, microphones, PCs for registration and places. The presenters prepared the material to be presented and the background for the webinar event. Then students who were present at the zoom meeting filled out the attendance list via the Google form and pretest.

The participants who registered were 100 participants, along with the participants who attended the event in the zoom meeting application as can be seen in Figure 2. The event was held on Mey 11, 2024 at the STIKes Muhammadiyah Aceh Campus, Jl. Harapan No. 14 Punge Blang Cut. While the participants took part through the zoom meeting application.

Figure 2. Community Service Participants

Furthermore, the speaker conveys the material as shown in Figure 3 below:

Figure 3. Submission of Material by Speaker

The pretest and posttest results are as shown in the following figure 4 below:
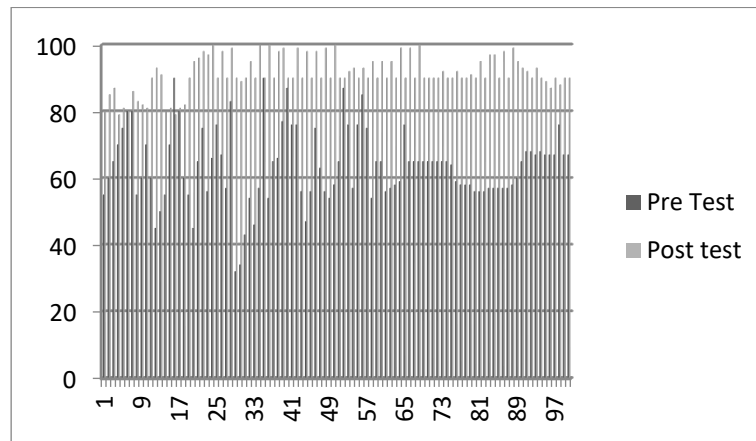

Figure 4. Pre Test and Post Test Results

From the results of the pre-test and post-test, it can be seen that there is an increase in knowledge where during the pre-test the average score is 61.58 and after the post-test the average score is 92.18. So that it can be seen that there is an increase in understanding of the material by 31.27%.

4 Conclusions

The conclusion that can be drawn is that during the pandemic, socialization activities in the form of webinars were in great demand by the community, where after the participants filled out the pretest about ventilator equipment, they obtained results with an average score of 63.58 and after filling out the post test, they got an average score of 91.18 or there was an increase of 30.27%.

5 Acknowledgment

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