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Online And Offline Training of Electric Vehicle Technology for Automotive Productive Teachers at Smkn Al Mufti, Subang Regency

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ABSTRACT

This study aims to improve competence by providing knowledge and skills regarding maintenance and repair of electric vehicle technology (electric vehicle technology) to automotive productive teachers at Al Mufti Vocational School, Subang Regency. The training uses multiple approaches to simplify, strengthen and apply. The approach used is persuasive, collaborative and participatory. The method used is discussion, lecture, question and answer, demonstration and practice on electric cars, electric motorcycles and decomposed components. The level of achievement based on knowledge and skills carried out by post-test and pretest as well as performance tests shows the achievement of competence of 80 percent, so it is hoped that participants can transfer this electric vehicle technology to students in anticipation of the development and transition of driving technology from internal combustion engines (ICE) to electric drive.
Keywords: Electric vehicles, competence, productive teachers

INTRODUCTION

Automotive technology is developing rapidly, one of which is the vehicle propulsion system. The current vehicle propulsion system uses an internal combustion engine (ICE), both diesel and gasoline engines. Internal combustion engines use fossil fuels. Currently, the availability of fossil fuels is very limited. Based on data from the Directorate General of New Renewable Energy and Energy Conservation of the Ministry of Energy and Mineral Resources, in recent years Indonesia's energy consumption growth has reached 7% per year. This figure is above the growth in world energy consumption of 2.6% per year. Based on data from the Indonesian Ministry of Energy and Mineral Resources, Indonesia's energy consumption is quite high, almost 95% of fossil fuels. Of this total, almost 50% is fuel oil (BBM). So it is not surprising that energy consumption in the transportation sector has also tended to increase in recent years. https://www.kompasiana.com/cakmat/599aefc15af02c183e6ca1d2/cadangan-energi-indonesia-menipis-saatnya-melek-energi-terbarukan?page=all Facing the challenges of depleting energy reserves, saving energy is a smart step. However, the increase in energy consumption as an indicator of Indonesia's economic progress must still be facilitated by the presence of supporting energy sources. Facing these challenges, our country needs to expand the use of other energy sources to replace the use of oil and fossil energy.

Professor of the Sepuluh Nopember Institute of Technology Surabaya, Djoko Sungkono, Wednesday (27/07/2011), explained that according to experts, oil, natural gas and coal, which are said to be fossil fuels, are expected to run out in 30 years. gas runs out in 70-80 years, and solid fuels in 120 years. https://sains.kompas.com/read/2011/07/27/20141288/bahan.bakar.fosil.habis.30.tahun.lagi

Based on these problems, several vehicle manufacturers, both two-wheeled and four-wheeled vehicles, have begun to shift the source of vehicle propulsion from internal combustion engines to electrical energy. The transition starts from hybrid vehicles, battery electric vehicles, plug-in electric vehicles and hydrogen. Currently, many vehicle manufacturers have started marketing their electric vehicles, both two-wheeled and four-wheeled.

There are several differences between an internal combustion engine (ICE) drive and an electric motor. Electric motors have fewer components than ICE, but there are several new technologies, especially regarding controllers, battery management systems and electric motors using the brushless direct current (BLDC) type and others. Of course, this technology must be

introduced to the public, so that people are not surprised by the technological change that can cause a gap between industry and technicians and users.

One way to introduce electric vehicle technology is by introducing it to productive automotive teachers, both light vehicle engineering (TKR) and motorcycle business engineering (TBSM) productive teachers. These productive teachers are the targets of introducing electric vehicle technology because they will teach prospective vehicle technicians, so that once there are many electric vehicles on the market and require maintenance, these SMK graduates already understand and are ready with the new technology.

The UPI Automotive Engineering Education study program since 2012 has conducted research on electric vehicles and has even won the Drivers world championship shell eco marathon event in London UK in 2016. In addition to international championships, it also often wins national championships held by the Ministry of Research, Technology and Higher Education. Based on these problems and background, the Automotive Engineering Education study program felt compelled to carry out the Dissemination of Electric Vehicle Technology (Electric Vehicle Technology) to Automotive Productive Teachers at Smk Al Mufti Regency. Subang. This dissemination is a service provided to the community as part of the task of the Tri Dharma of Higher Education, namely Community Service. Dissemination is carried out in a practical and simple manner, so that participants can easily understand.

METHOD

The effectiveness of the training is determined by the method used in delivering the material. The training uses multiple approaches to simplify, strengthen and apply. The approach used is persuasive, collaborative and participatory. A persuasive approach is taken so that they do not feel taught, dictated or forced in terms of knowledge and skills. A collaborative approach is carried out to invite together and practice with the aim of accelerating the internalization of the material. Collaborative approach is considered important, because they feel invited to cooperate and valued.

The method used in the training is to combine several methods, including: lectures, questions and answers, discussions, simulations, and demonstrations. The lecture method is used to provide participants with complete knowledge and understanding of the training topic. The discussion method is to describe the material framework in a complete, clear, easy to understand, and applicable manner. The lecture method will be used to open insights and examples of cases and their solutions, followed by discussion and question and answer. The portion of time for discussion and practice is more than for lectures.

1. Training Materials

The materials given at the Dissemination of Electric Vehicle Technology to Automotive Productive Teachers include:

a. K3 (health, work safety)
b. Tool introduction
c. Types of electric vehicles
d. Main component
e. How the electric vehicle system works
f. How to detect faulty electric vehicle systems
g. How to check and repair electric vehicles

2. Preparation of tools and materials

Skills training, of course, requires tools and materials. The tools needed include:

a. Tool box contains complete keys
b. Tray for storing spare parts and for washing spare parts
c. Air compressor
d. Air gun
e. Scanner/diagnostic tools
f. Tachometer
g. Multimeter

The materials needed are as follows:

a. Electric cars and electric motorcycles
b. Battery
c. Controller
d. BLDC Motor
e. inverter
f. Hall Sensor
g. Instrument

3. Place and Time of Training

The activity was carried out at the Light Vehicle Engineering workshop at SMK Al Mufti Regency. Subang. The training has been held from Tuesday to Wednesday, August 24 to 26, 2021, 08.00-15.00 WIB.

RESULTS

Participants in the Dissemination of Electric Vehicle Technology (Electric Vehicle Technology) are Productive Automotive Teachers who have not received information and materials about electric vehicle technology. They are the spearhead in delivering information to the public. The teacher is a teacher of prospective vehicle mechanics in the industry, so that before electric vehicles boom and require maintenance and repairs, prospective mechanics already have competence about maintenance and repair of electric vehicles, both four-wheeled vehicles and two-wheeled vehicles.

DISCUSSION

The output target of community service Dissemination of Electric Vehicle Technology (Electric Vehicle Technology) to Productive Automotive Teachers is that automotive productive teachers can have competence in the care and maintenance of electric vehicles. So that with this training in electric vehicle technology along with the transition and development of energy source technology for driving vehicles, teachers can teach and provide information to their students. This will reduce the gap between the world of education and the world of industry.

The level of achievement based on knowledge and skills carried out by post-test and pre-test as well as performance tests showed an achievement of 85 percent. So that the participants of this training can be said to be worthy of teaching to their students. Thus, this training is expected to be able to participate in reducing the technology gap.

CONCLUSIONS AND RECOMENDATION

1. Community Service Dissemination of Electric Vehicle Technology (Electric Vehicle Technology) to Automotive Productive Teachers is carried out as planned
2. After the Dissemination of Electric Vehicle Technology to Automotive Productive Teachers, participants are generally skilled in performing maintenance and repair of electric vehicles so that they are ready to transfer competence to their students.
3. Competence for maintenance and repair of electric vehicles is very much needed considering that currently electric vehicles have begun to be marketed in the community so that it will reduce the gap between Industry and Education.

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