



Agricultural Diesel Motor Maintenance and Repair Training with the Application of a Combined Learning Model between Peer Teaching and Practice Rehearsal Pairs in Sonosewu Farmer Groups

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ABSTRACT

Industrial development also spread to the world's agricultural sector. The agricultural industry is divided into two parts, namely upstream and downstream. The upstream sector includes the processing of agricultural land up to the harvesting process, while the downstream sector includes the post-harvest processing of agricultural products. Both of them do not escape the use of technology in the form of the use of modern equipment. For example, the traditional processing of agricultural land, which originally used cattle to plow the fields, has now been replaced by diesel-powered tractor equipment. In the agricultural product processing sector, the role of humans pounding rice is replaced by diesel motor-driven rice mills so that many human workers are replaced by machine tools. The research conducted aims to provide an understanding to the community, especially farmers in the management of diesel use in agriculture. The highlighted activities are for improvements and understanding of diesel maintenance. This affects the price paid for repairs at agricultural diesel repair sites. Understanding the minor defects that occur in agricultural diesel helps reduce these costs. The training approach also uses peer teaching and Practice rehearsal Pairs. This is based on the background and approach of participants aged 40 years and over. The results obtained are quite good. The post-test carried out at the end of the session showed an increase of 18 percent from the pre-test.

Keywords: *Agricultural Diesel, Peer Teaching and Practice Rehearsal Pairs, Test*

1. INTRODUCTION

The development of industry in the world is greatly influenced by existing technological developments from time to time. The beginning of technological development began with Industry 1.0 which was sparked by the British industrial revolution at the beginning of the 18th century. Industry in England utilized energy from steam engines to provide cheap energy to replace the role of livestock to turn the wheels of industry. Continuing into the industrial era 2.0. There is a struggle for natural resources as raw materials for industrial products. The industrial revolution 2.0 lasted until the industrial era 3.0 now the world has reached industrial revolution 4.0. The characteristic of the Industrial Revolution 4.0 which

started in the 21st century is the use of IoT or Internet of Things technology to move the wheels of industry[1].

The characteristic that is a factor in changes in the industrial world starting from Industry 1.0 to the Industrial Revolution 4.0 is the change in behavior in running the wheels of production in the industry[2]. This behavior change is a method in the production process that has changed due to the discovery of new technology. The discovery of this new technology can change the production process to run more efficiently and more productively than in the previous period.

A technological approach to industry can save production costs because human labor is replaced by mechanical equipment[3]. Technology is also able to cut

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production time in an industry because production equipment can work 24 hours a day without needing a break. Apart from that, with the help of technology, it is also possible to reduce product failure due to human error. All industrial developments require two basic things, namely efficiency and effectiveness[4]. Efficiency is shown by reducing production costs and effectiveness is also shown by high levels of productivity.

Industrial development also spread to the world's agricultural sector. The agricultural industry is divided into two parts, namely upstream and downstream[5]. The upstream sector includes processing agricultural land up to the harvest process, while the downstream sector includes post-harvest processing of agricultural products[6]. Both of them do not escape the use of technology in the form of the use of modern equipment. For example, traditional agricultural land processing, which originally used cattle to plow the fields, is now being replaced by diesel-driven tractor equipment. In the agricultural product processing sector, the role of humans pounding rice has been replaced by rice milling machines driven by diesel motors, so much of the human workforce has been replaced by machine tools.

Sonosewu Hamlet, located in Kasihan District, Bantul Regency, has residents who work as farmers with a percentage of more than 15%[7]. Most of the farmers in the village grow rice and a small number grow secondary crops[8]. Most farmers use diesel motors to drive agricultural equipment. These agricultural tools include rice field plowing machines, irrigation pumps, rice mills, morning harvesters, rice dryers, and so on. Only a small percentage still use livestock to move agricultural equipment.

The diesel motors used by most farmers and planters in Dukuh Sonosewu require care and maintenance so that they can continue to be used in the long term. The results of an interview with one of the heads of the farmer group association (Gapoktan) in Dukuh Sonosewu, namely Mr. Rohim, stated that the farmers' diesel motorbikes were only serviced and repaired if problems were encountered during use, apart from these conditions, the farmers thought that their diesel motorbikes were fine. Diesel motors that are never maintained will cause damage and problems when used. This damage and problems can disrupt farmers' work processes related to the land cultivation process. If the land cultivation process is disrupted due to agricultural equipment being moved by a faulty diesel motor, this will have an impact on agricultural yields that are not optimal. Agricultural results that are not optimal are caused by, for example, taking longer to cultivate the land and harvesting time which is not on time, which results in increased

production costs. So far, if there is damage to agricultural equipment, farmers have to bring in specialist diesel motor technicians from outside the area. Apart from that, the waiting time for technicians to repair requires 1 to 2 working days before the agricultural equipment can be repaired. Equipping farmers with diesel motor care and maintenance skills will make farmers more independent and no longer need the help of technicians, Besides that the costs that farmers have to pay to maintain diesel motors will also be reduced.

2. MATERIALS

At present many learning models are oriented towards student-centered learning, this has changed from the previous instructor-centered learning activities[9]. In the student-centered learning model, students are required to be more actively involved in learning activities, while the instructor only acts as a student partner whose task is to facilitate student needs about the achievement of learning objectives. Many learning models can be called student-centered learning, some examples of which are peer teaching and practice rehearsal pairs[10].

Peer teaching is a learning model in which the implementation involves several students who learn through peer tutorials, peers here are students who have knowledge and skills that are considered more than other friends, students who are like this are called tutor students who then teach their learning experiences to students other. The advantage of this method is that students will usually become more active in listening and asking tutor students because the gap between students can be minimized, students also become more active in checking and re-checking understanding between students with each other. The instructor here is tasked with teaching knowledge to tutor students at the beginning of learning and supervising peer teaching activities to avoid misunderstandings or misunderstandings[11]. The procedure for carrying out this peer teaching model is as follows: 1. Set learning objectives by mastering a certain subject matter, 2. Divide students in one class into small groups where each group has one student who is appointed to be a tutor for other students in the same group. 3. The instructor gives a short but clear tutorial to all groups to be put into practice in each group through student tutors. 4. The instructor supervises the progress of peer teaching activities. 5. All groups present their learning results in front of the class and the instructor checks whether there are any wrong concepts.

Another example of a learning model that is student-centered learning is practice rehearsal pairs. This learning model is used to practice a skill or procedure with a study partner with repeated practical exercises using the

information to learn it. The practice rehearsal pairs learning model is very suitable for use in teaching materials that prioritize learning outcomes in the form of skills or psychomotor skills because, in this learning model, students are made into pairs and then given teaching materials that must be mastered by that group of students within a certain time[12]. The procedural steps in carrying out practice rehearsal pairs are as follows: 1. The instructor determines one teaching material that contains competencies that students must master. 2. The instructor divides students into small groups consisting of two members, namely: the demonstrator and the observer. 3. Then the instructor shows a tutorial in the teaching material, then the demonstrator's task is to re-practice what the instructor has done, while the observer's task is to check whether what the demonstrator has done correctly is by what the instructor exemplified. 4. The next step is to exchange roles, students who were previously demonstrators then become observers, and vice versa. 5. Evaluation is carried out by the instructor/instructors to find out the extent of student learning outcomes, and whether they have mastered the competencies or not[13].

The peer teaching and practice rehearsal pairs learning models have similarities and differences in their implementation, they all have advantages and disadvantages, but it would be better if the two learning models were combined to become a learning model that brings optimal learning results. In this research activity, two different learning models were carried out, namely peer teaching and practice rehearsal pairs, which aimed to tie learning outcomes, especially to students' skills or psychomotor skills. The application of the combination of these two learning models produces several implementation procedures that complement each other but do not conflict with each other between the two models, resulting in the following procedural steps: 1. Determining learning achievement goals. 2. Divide into small groups with the consideration that students who are considered to have more experience than other students (indicated by the pretest results) are evenly distributed in each group. 3. The instructor shows a tutorial in the teaching material, then the demonstrator's task is to re-practice what the instructor has done, while the observer's task is to check whether what the demonstrator has done correctly is by what the instructor exemplified. 4. The next step is to exchange roles, students who were previously demonstrators then become observers, and vice versa. 5. Evaluation is carried out by the instructor/instructor to find out the extent of the student's learning outcomes, and whether they have mastered the

competency or not. The combination of learning models in this research activity resulted in the activity title: Training on Maintenance and Repair of Agricultural Diesel Motors with the Application of a Combined Learning Model Between Peer Teaching and Practice Rehearsal Pairs in the Sonosewu Farmer Group.

3. METHODS

This research method uses the Classroom Action Research Method. Classroom action research aims to solve learning problems in the classroom and also develop learning strategies to solve these learning problems. Classroom Action Research (CAR) is a research design specifically designed to improve the quality of learning in the classroom[14]. Researchers in classroom action research are instructors who are directly involved in classroom learning. Thus, instructors who conduct classroom action research can be called teacher researchers.

The obligation of research instructors in classroom action research is to solve learning problems in their class and produce scientific work in the form of innovative learning strategies as a solution to solve learning problems encountered. There are many Classroom Action Research (CAR) models, in this study using the LKurt Lewn CAR model. Kurt Lewn's version of the CAR model states that one cycle in Classroom Action Research (CAR) consists of four stages, namely: 1. planning; 2. acting; 3. observing, and 4. reflecting[15].

4. RESULTS

The qualifications obtained in this study refer to the course of activities and Practice of Rehearsal Pairs as well as the results obtained in implementing the practice. The activities carried out used participants who were direct practitioners at Kapanewon Sonosewu. The background participants are farmers and users of diesel motorbikes as a rice field plow tool. The qualifications tested are knowledge of diesel engines and damage repair techniques. The qualification for implementing Peer Teaching and Practice Rehearsal Pairs is to seek effective communication in increasing insight abilities[16].

Peer Teaching and Practice Rehearsal Pair activities use the pre-test and post-test methods. The pre-test is used to see initial abilities and see how far the participants' insights are. While the post-test is used to measure the absorption of material and the sustainability of peer teaching activities. As far as the data is taken there is an increase in knowledge and practice skills between before and after the test by 18%.

TABLE 1. Pre-Test dan Post-Test

Aspect	Score
Average pre-test score	68,2
Average post-test score	79,4

The assessment aspect is based on several abilities in practice[17]. Practical activities are generally carried out with guidelines for checking the heating iron for fuel fogging and adjusting engine speed. The time used for

activities is 15 minutes per session with a tolerance of 5 minutes. The appraiser uses a media portfolio with a score of 10 for perfect work, a score of 5 for work done but imperfect, and a score of 0 for not done.

TABLE 2. Jobdesks

Sequence of Work	Average Score
Loosen the 2 diesel high-pressure pipe fixing nuts to the injector	10
Loosen the 2 injector mounting bolts and remove the injector unit from the engine	10
Dismantling the injector unit and overhauling the injector unit	10
Remove and clean the needle valve assembly and housing with carburetor cleaner	10
Reassemble the injector unit as before	10
Calibrate the injector opening pressure at a pressure of 11-12 bar on a pressure gauge device.	7
Refit the injector unit to the engine	5,333333
Bleed or drain the high pressure pipe by rotating the crankshaft.	10
Starting the diesel motor so that the diesel motor starts and rotates easily.	7,333333

The understanding obtained becomes the basis for researchers in drawing conclusions and analyzing problems that occur. The existing community background is the biggest obstacle that can be felt. This influences practical activities and the application of peer teaching and Practice rehearsal Pairs[18]. Experience in the field so far has made several steps and procedures in servicing and repairing diesel engines less than optimal. This occurs when calibrating the injector, reinstalling the injector unit, and starting the diesel motor.

CONCLUSION

The research conducted aims to provide an understanding to the community, especially farmers in the management of diesel use in agriculture. The highlighted activities are for improvements and understanding of diesel maintenance. This affects the price paid for repairs at agricultural diesel repair sites. Understanding the minor defects that occur in agricultural diesel helps reduce these costs.

The training approach also uses peer teaching and Practice rehearsal Pairs. This is based on the background and approach of participants aged 40 years and over. The results obtained are quite good. The post-test carried out at the end of the session showed an increase of 18 percent.

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