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Improve student competence of light vehicle engineering expertise program according to industrial needs

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Abstract: This activity intends to encourage the implementation of the "Freedom to Learn" program promoted by the Indonesian government. Vocational school students are prepared to learn skills so that graduates have the qualifications expected by the world of work according to their respective fields. In this case, Vocational High Schools can adjust the industrial work culture so that students, when they graduate, can adjust the fields studied appropriately. This research method is qualitative research. Data collection techniques used interview, observation, and documentation methods in this research. The data analysis technique uses the triangulation test. From the research results, seven students could get good car service, and one student did not do well. In implementing the 5R/S work culture, eight students all did well. Time to complete the work: 2 students completed over 60 minutes, and six students under 60 minutes. With these results, special treatment is needed, namely doing a lot of car service work regularly, to improve the results obtained. This work takes approximately 30 – 45 minutes to complete for industry standards.

Keywords: 5S work culture, car service, light vehicle engineering

Meningkatkan kompetensi siswa program keahlian teknik kendaraan ringan sesuai kebutuhan industri

Abstrak: Tujuan kegiatan ini dimaksudkan untuk mendorong terlaksananya program "Merdeka Belajar" yang digalakkan oleh pemerintah Indonesia. Siswa SMK disiapkan untuk mempelajari keterampilan sehingga lulusannya memiliki kualifikasi yang diharapkan dunia kerja sesuai bidangnya masing-masing. Dalam hal ini SMK dapat menyesuaikan budaya kerja industry agar siswa ketika lulus dapat menyesuaikan bidang yang dipelajari dengan tepat. Metode penelitian ini adalah penelitian kualitatif. Teknik pengumpulan data pada penelitian ini menggunakan metode wawancara, observasi dan dokumentasi. Teknik analisis data menggunakan uji triangulasi. Dari hasil penelitian dapat diperoleh servis mobil dengan baik sebanyak 7 siswa, 1 siswa kurang baik. Untuk penerapan budaya kerja 5R/S 8 siswa melakukan dengan baik semua. Waktu penyelesaian pekerjaan, 2 siswa menyelesaikan diatas 60 menit dan 6 siswa dibawah 60 menit. Dengan hasil ini perlu adanya perlakukuan khusus yaitu banyak melakukan pekerjaan servis mobil dan secara teratur, agar hasil yang didapat lebih baik. Untuk standart Industri pekerjaan tersebut membutuhkan waktu kurang lebih 30 – 45 menit dalam penyelesainnya.

Kata Kunci: Budaya kerja 5S. servis mobil, teknik kendaraan ringan

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INTRODUCTION

Vocational High Schools (VHS) are educational institutions that prepare graduates for work, both in the industrial and business world (Wahyuningtyas, 2021). Because it does not rule out the possibility that students who graduate from school will not work in companies but rather start their own businesses. When these students enter vocational schools, which emphasize practice (Chiang & Lee, 2016). Therefore, there needs to be motivation and encouragement so that after graduating they can compete in the fields of knowledge and skills. This is in accordance with educational achievements in the curriculum in Indonesia (Lelasari et al., 2021; Retnawati & Nugraha, 2016). The existence of Vocational Schools is one solution to the problems that occur in the world of education today, especially in preparing a generation of graduates who are ready to work. Student learning needs include learning, teaching and learning procedures, the roles of teachers and students, and the teaching and learning environment (Mahbub, 2018). One of the important components in vocational school education is to improve the quality of graduates. as well as teachers who are competent in the field of vocational concentration (Estriyanto et al., 2017).

Vocational school students are prepared to learn skills so that they graduate (Ayaz et al., 2023). Have the qualifications expected by the world of work according to their respective field of expertise (Hermawan et al., 2021). It is hoped that vocational school graduates can dominate the absorption of graduates in the world of work, both in the industrial world and the business world. In the world of education, efforts are made to produce competent and high-quality workforce both at university level, such as Diploma and Polytechnic programs, as well as Vocational High Schools to increase quality workforce (Kamdi, 2010). and vocational school graduates are able to compete and show the quality of their skills, both individually and working in teams (groups) (Ulfah & Arifudin, 2021). Vocational schools were formed to produce graduates who are ready to work (Akbar et al., 2022). The purpose of establishing VHS has been regulated in Law Number 20 of 2003 which is divided into general objectives and special objectives. Vocational school objectives regarding facing the world of work are listed in the special objectives. The specific objectives of vocational schools according to Law Number 20 of 2003 are as follows (Meiliasari et al., 2022):

a. Prepare students to become productive human beings, able to work independently and fill existing job vacancies as a middle-level workforce by competence in their chosen skill program.
b. Prepare students to be able to choose a career, tenacious and persistent in competence, adapt to the work environment, and develop a professional attitude in the field of expertise they are interested in.
c. Equipping students with science, technology, and art to be able to develop themselves in the future both independently and through higher education.
d. Equipping students with competencies appropriate to the chosen skill program.

Referring to its purpose, learning in VHS is oriented towards developing students' competencies to master and carry out certain jobs. Learning activities in SMK are dominated by practical activities, which is as much as 70%, and the rest is theory in the classroom (Zahrok, 2020). Regarding the job creation law policy, reducing unemployment in the Blitar area and its surroundings, SMK Negeri 1 Udanawu will be able to compete in the industrial

and business world because the competencies obtained at school are the main provisions for work.

In vocational schools themselves, many competencies are taught according to each concentration. Learning in general is almost the same as other schools which prioritize student learning development. with direct or indirect learning methods (Mentari, 2022). At SMK Negeri 1 Udanawu, one of the vocational schools in the Blitar Regency area, there are concentrated five skill programs: Computer Network Engineering, Building Modeling and Information Design, Welding Engineering, Light Vehicle Engineering, Online Business and Marketing. These five programs have collaborated with the industrial and business world according to their respective competencies. This collaboration was carried out as an effort to improve the quality of learning and student skills (Moses, 2017). And the Light Vehicle Engineering Department has collaborated with several companies that concentrate in the automotive sector, one of which is PT. Astra Daihatsu Motor (PT. ADM).

PT. Astra Daihatsu Motor (PT. ADM) fosters vocational secondary schools of automotive engineering expertise competencies to prepare graduates who are ready for work and work in Industry (Ahkyat et al., 2019). In this case, it increases the competence of expertise in the automotive field, instills an industrial work culture, and prepares students to enter the world of work. This is also an effort by SMKN 1 Udanawu to improve the quality of quality graduates. Therefore, it is important to collaborate with Industry and be very supportive of the government's attention in the Blitar Regency area, especially to reduce the number of unemployment. With the collaboration with Industry, making benchmarks or benchmarks for student competency achievements to match the expectations of the industry (PT. ADM). Students who study at SMK Negeri 1 Udanawu must be equipped with more skills than before because it will impact their abilities in their fields (Light Vehicle Engineering). Improving the ability of these students can come from learning in school in theory-practice and experience participating in practical fieldwork activities. Later, students who take the Light Vehicle Engineering Expertise program are expected to be able to work and consistently explore the automotive field. They will work to become professional technicians. Vocational students Department in automotive have an interest in working as technicians, which is included in the high category (Aliyah et al., 2019).

The Light Vehicle Engineering Department was chosen because the department has a high opportunity to enter the world of Industry and entrepreneurship. In the learning process, students who have chosen the TKR department have been equipped with expertise in the field of technicians (Santika et al., 2023). Most vocational students have a good level of job readiness. However, these students still need support, guidance, and direction to better prepare themselves for their field of work, namely as technicians or mechanics, so that these students have better job readiness (Hidayat et al., 2016). It is undeniable that work opportunities and the need for the world of work are very large, but the readiness of students to enter the world of work still needs to be improved. This underlies this research to apply industrial work culture in the school environment, especially the Light Vehicle Engineering department at SMKN 1 Udanawu, Blitar Regency, in car service competence. Therefore, it is a great concern to improve car service competence is very important for students Department in light vehicle engineering.

Vehicles are among the most important elements for the community's needs to support their lives. The vehicle must be serviced periodically to be used effectively

(Setiawan, 2018). The vehicle consists of components and systems that work as a whole to function as we drive today. The use of vehicles, in general, is to transport people or goods from one place to another. Vehicles consisting of thousands of components in operation or work get various loads of friction, pressure, impact, blow, twist, compressive-tensile-bending, heat loads, chemical loads, and so on (Harrison et al., 2021; Xu et al., 2021). The longer it is used, the vehicle components will wear out, become looser, weaker, or deviate their precision from the original good and standard condition. Therefore, by paying attention to the above, the vehicle is always in standard condition and ready to be used efficiently, economically, safely, and comfortably; the vehicle must get maintenance and repair damage or regular maintenance at the workshop. So, in vehicle workshops with various names in the community, the main activities carried out are the same: maintaining and repairing or maintaining existing vehicles. The difference is that one workshop does all kinds of activities to maintain and repair vehicles, and one specialist workshop only does certain jobs in maintaining and repairing vehicles. A workshop that works on all damage to all components or systems on a vehicle is called a general workshop, and a workshop that only works on maintenance for one or a few components or systems present on the vehicle is called a specialized or specialist workshop. The vehicle body workshop is a functional part of a factory that performs some activities in making or producing vehicles. There are factories that produce vehicles as a whole so that vehicles produced directly can be used by the public, such as sedans, jeeps, and small commercial vehicles. Some factories produce vehicles that are not complete, for example, some types of small commercial vehicles and buses, where the completion of work to build the body must be done specifically by the vehicle body workshop.

The Industrial Work Culture that is commonly applied is the 5S Work Culture adopted from Japan in the Indonesian Work Culture 5R (Pangestu & Negara, 2019).

1. S*eiri (Sort)* is throwing away/sorting/getting rid of unused items and files.
2. *Seiton (Set in Order)* Everything must be placed according to the set position.
3. *Seiso (Shine)* After being neat, the next step is to clean the workplace, workspace, equipment, and work environment.
4. *Seiketsu (Standardize)* stage, also called the treatment stage, is the standardization and consistency of each individual to carry out the previous stages.
5. *Shitsuke (Sustain)* The maintenance of personal discipline includes a habit and maintenance of the 5S program.

METHOD

The car service activity was carried out by eight students in grade 11 of the Light Vehicle Engineering Department, SMK N 1 Udanawu. This activity intends to encourage the implementation of the "Merdeka Belajar" program promoted by the Indonesian government in 2020. This activity hopes students can apply the knowledge gained in the light vehicle engineering department to car services. Students are actively involved in the car service process, starting from acceptance from consumers and working on service parts to vehicle inspection and testing.

The method of car service activities is to carry out vehicle or car services by students to apply knowledge and experience to light vehicle engine maintenance subjects. The implementation of car service activities is divided into three parts consisting of (1) pre-

activities, (2) implementation of activities, and (3) evaluation of activities. Pre-activity is divided into three activities ranging from (1) identifying car service parts and materials, (2) preparation of service practice workshops and tools used, and (3) preparing the vehicle or car for service. Students carry out the implementation of activities to service cars that have been prepared.

Table 1. 5S/5R work culture indicator

No	Work Culture	Bad	Good	Excellent
	Score	**0**	**1**	**2**
1	S*eiri (Sort)*	Not done at all	Done in the work	carried out in preparation, work, and final checking
2	*Seiton (Set in Order)*	Not done at all	Done in the work	carried out in preparation, work, and final checking
3	*Seiso (Shine)*	Not done at all	Done in the work	carried out in preparation, work, and final checking
4	*Seiketsu (Standardize)*	Not done at all	Done in the work	carried out in preparation, work, and final checking
5	*Shitsuke (Sustain)*	Not done at all	Done in the work	carried out in preparation, work, and final checking

Furthermore, this process was carried out at SMKN 1 Udanawu, Blitar Regency, in the Department of Light Vehicle Engineering. In grade 11, students Departmenting in Light Vehicle Engineering consisting of 8 students who will service cars on vehicles with standards and provisions in the industry supported by the implementation of 5S / 5R.

The commonly applied Industrial Work Culture is the 5S Work Culture adopted from Japan in the Indonesian Work Culture 5R (Bani et al., 2022). *Seiri (Sort),* i.e., dispose of/sort/remove items and unused files. *Seiton (Set in Order)*: Everything must be placed according to the set position. *Seiso (Shine)*: After getting neat, the next step is to clean the workplace, workspace, equipment, and work environment. *Seiketsu (Standardize)* This stage can also be called the treatment stage, which is the standardization and consistency of each individual to carry out the previous stages. *Shitsuke (Sustain)* Maintenance of personal discipline includes a habit and maintenance of the 5S program (Pangestu & Negara, 2019).

In this process, as the application of industrial work culture in schools, practical work will be carried out by automotive industry standards. In this case, each student will carry out car service on vehicles with standards and provisions in the industry supported by the implementation of 5S / 5R.

Car servicing is periodic maintenance work that refers to the vehicle's mileage. The work includes checking the electrical, power transfer, and engine systems. Usually, TKR's productive subject matter is taught individually. The implementation stage of the activity is carried out directly in the workshop or practical laboratory of the Light Vehicle Engineering Department, SMK N 1 Udanawu. The car service work carried out is presented in Table 2.

Table 2. Car service indicators

No	Work Activities	Inspection Items	Indicator
1	Accept PKB	Read work orders	Competent/incompetent
2	Preparation	Preparation Tools and Lifts	Competent/incompetent
3	Seat Cover	Install the Seat Cover (seat cover)	Competent/incompetent
4	Check Electrical (seat driver)	Check headlights, signs, hazards, reverses, tail lights, fog lights, twilight lights)	Competent/incompetent
5	Check AC & Radio	Check AC &; Radio	Competent/incompetent
6	Windshield (Driver seat)	Check washer, wiper &; Ruber blade function	Competent/incompetent
7	Cabin	Check cabin lights & courtesy switches	Competent/incompetent
8	Power Window	Power window and central door lock	Competent/incompetent
9	Parking brake	Check the parking brake	Competent/incompetent
10	Steering Wheel	Check the Steering wheel & Horn Function	Competent/incompetent
11	Pedal	Check Brake & Gas Pedals	Competent/incompetent
12	Nut & Bolt on the body	Check nuts and bolts on the body & tank cap	Competent/incompetent
13	Fender cover	Installation of Fender cover set	Competent/incompetent
14	Engine room	Check the fluid in the engine room (oil, washer, brake fluid, battery water)	Competent/incompetent
15	Box Air Cleaner	Clean the Air filter	Competent/incompetent
16	Drive belt inspection	Check belt drive	Competent/incompetent
17	Spare tire checking	Check tires, wheels & spare tires	Competent/incompetent
18	Ball joint	Check ball joint &; boot	Competent/incompetent
19	Engine Oil	Drain engine oil, change oil filter (acting)	Competent/incompetent
20	M/T transmission oil	Check M/T transmission oil	Competent/incompetent
21	Differential	Check oil differential	Competent/incompetent
22	Fuel	Check for leaks and ducts	Competent/incompetent
23	Exhaust pipe &;	Check exhaust & mounting	Competent/incompetent

	Mounting	condition	
24	Chassis (underside of the vehicle)	Check the bottom nut and Bolt of the vehicle	Competent/incompetent
25	Suspension	Check spring & absorber	Competent/incompetent
26	Wheel bearings	Check wheel bearings	Competent/incompetent
27	Check Tire	Check for tire wear, & Wheels,	Competent/incompetent
28	Tire	Remove Tires	Competent/incompetent
29	Brake pad & disc	Clean and measure brake pad & disc brake	Competent/incompetent
30	Brake Shoe & Drum	Clean and measure brake shoe & drum brake	Competent/incompetent
31	Check the brake system	Check for lines & leaks	Competent/incompetent
32	Install Tires	Install Tires (rotation) of front tires	Competent/incompetent
33	Tire Pressure	Tire Pressure	Competent/incompetent
34	Tire Torque	Tires at torque	Competent/incompetent
35	Engine Room	Engine oil content (acting)	Competent/incompetent
36	Spark plug	Replace new spark plugs (Conventional)	Competent/incompetent
37	Engine Room Inspection	Check engine sound & vibration, blow-by gas, front absorber support, AC refrigerant, & charcoal canister.	Competent/incompetent
38	Engine room	Check the fluid in the engine room	Competent/incompetent
39	Battery Inspection	Check voltage, spectrolite level, and the physical condition of the battery (vent plug, body battery, terminal battery)	Competent/incompetent
40	Examination of the results of the work	Check the tightness of the drain plug bolts	Competent/incompetent
41	Finishing	Clean the unit after maintenance	Competent/incompetent
		Remove the fender Cover set.	Competent/incompetent
		Place used parts on the	Competent/incompetent

		vehicle.	
		Check the exhaust emission content at idle (acting)	Competent/incompetent
42	Final check	Checking all work by Karu (acting)	Competent/incompetent

RESULTS

This research was conducted at SMKN 1 Udanawu, Blitar Regency, in the Department of Light Vehicle Engineering. Grade 11 students Department in Light Vehicle Engineering consist of 8 students. Furthermore, it will carry out car service for each student and take the results of car service competence and speed in its completion. In completing the car service process, each student will be observed and given the same work assignment sheet, which will be done in order later. One by one, it is done according to work procedures by applying the correct 5S culture. In addition, during car service work, the time will be calculated until completion so that the time achievement can be measured according to the length of the work at hand. The vehicle used is a Daihatsu Xenia, a 2009 practical car Department in Light Vehicle Engineering SMKN 1 Udanawu. All students get the same vehicle, tools, and worksheets so that standardization is similar for each student. Based on the results of the implementation of car service in the time obtained by each student, the car service process and the implementation of the 5S work culture can be seen in Table 3.

Table 3. Data implementing 5S work culture in car service by students

Student	Car Service indicator	5R/S	Time
STUDENT 1	Competent	Good	65.40 minutes
STUDENT 2	Competent	Good	53.15 minutes
STUDENT 3	Competent	Good	60.05 minutes
STUDENT 4	Competent	Good	57.30 minutes
STUDENT 5	Competent	Good	54.20 minutes
STUDENT 6	Competent	Good	52.05 minutes
STUDENT 7	Competent	Good	55.40 minutes
STUDENT 8	Competent	Good	52.30 minutes
	Average		56.23 minutes

Table 3 shows data about student competency in the car service process. This data is based on the length of completion time, the car service work process, and the implementation of the 5S work culture. The achievement of time varies greatly, and absolutely nothing is the same. They are starting with Studen 1, who can complete the time with a maximum record of 65.40 minutes, and on behalf of Studen 6, with a record the fastest completion time of 52.05 minutes. On average, others take almost as much as 60 minutes to complete car service. The next table of car service processes is considered competent because they can carry out orders well and work according to the service

worksheet. However, there are still things to be reminded of; they can carry out work independently.

DISCUSSION

The implementation of 5S work culture can be implemented well by all students and they understand how important work culture is. The 5s work culture helps complete work quickly, precisely and easily. In this way, car service work runs safely and comfortably without unwanted things happening. Using the 5S work culture helps workers not to carry out unnecessary activities, reduces errors and reduces working time (Mu'adzah et al., 2020). The results of this research show that all students take turns carrying out the car service work process with the Daihatsu Xenia vehicle. Students can service a car in less than 60 minutes. A total of six students, two students completed the car service in more than 60 minutes. To complete car service work, the eight students were able to complete the work with a competent title; in other words, they can service the car well. Good implementation of 5S will create high productivity and increase efficiency and effectiveness in work (Haryudiniarti et al., 2022).

This car service work process is the first step to measure students' ability to apply industrial culture and competency requirements in automotive companies. It is intended that this learning will be a provision for Light Vehicle Engineering students when they are involved in the industrial world. The acculturation of vocational students in the use of 5S culture helps them to work in an environment similar to the industrial world (Pramono et al., 2020). Students become more adaptable and improve the quality of work after they are involved in the 5S work culture. VHS school is related to the world of work so students must be well prepared through an industrial work culture (Wahyudi et al., 2020). Eight students involved in 5S cultural activities showed they could work well. These findings indicate that they can use the 5S culture at work, so that work becomes more efficient.

Bsed on the results of this research, students can service cars well because they have become accustomed to servicing cars over time. The 5S work culture is one of the best tools for producing change, where work results are obtained over a long time and require patience and constant effort (Jaca et al., 2014). The 5S work culture has a significant and positive effect on work readiness (Maulidina & Wijanarka, 2023). Good skills from students in working in car servicing are what the industry expects. Therefore, special maintenance is needed, namely by carrying out lots of car service work regularly or consistently so that the results are better and maximum. Creating work spaces that are appropriate to the real world helps vocational students to increase the use of 5S work culture (Jiménez et al., 2015). For work in the car service industry, the work usually takes approximately 30 minutes to complete. In our findings, students worked on car servicing for around 56.23 minutes. Getting used to the use of 5S culture still needs to be carried out continuously in order to create vocational school graduates who have good competencies.

CONCLUSION

Based on the results and discussions that have been carried out, it can be concluded that the Students of SMKN 1 Udanawu Department in Light Vehicle Engineering can do car service and 5S industry work culture well. Students of SMKN 1 Udanawu Department in Light Vehicle Engineering with the car service process and 5S industry work culture can

introduce industrial culture according to work standards and its application in the business and industrial worlds. Students of SMKN 1 Udanawu Department in Light Vehicle Engineering can determine the quality of understanding and mandate work in car service and industrial culture 5S.

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