

## Conference Paper

# Implementation of 5S in the Automotive Laboratory - A Case Study

Ranu Iskandar<sup>1</sup>, Zainal Arifin<sup>2</sup>, and Herminarto Sofyan<sup>2</sup>

<sup>1</sup>Departement of Technological & Vocational Education, Graduate School, Yogyakarta State University

<sup>2</sup>Departement of Automotive Engineering Education, Faculty of Engineering, Yogyakarta State University

### Abstract

This research aims to identify the difficulties of 5S implementation in Automotive Laboratory of Mechanical Engineering at UGM Vocational School. This research belongs to the type of case study. The techniques of data collection are interviewing, observation, and questionnaire. The techniques of data analysis are by data reducing for interview result and category scoring for questionnaire result. The difficulties of implenting 5S at Automotive Laboratory of Mechanical Engineering, Vocational School UGM are that 1) unused lab materials are not concised yet, 2) trainer kit and engine stand are not well-organised, 3) it necessary to add visual aids, especially K3, and 4) there is no long-term 5S habituation. Possible solutions to those problems are by 1) organising unused materials in accordance with the needs and storing them in the warehouse for materials which has never been used for years, while the necessary materials are placed in the middle of working area, 2) designing the placement of practicum material using colour labelling on the floor, 3) adding more K3 posters in automotive laboratory, and 4) increasing the tendering grants and establishing harmonious communication between educational staffs and students.

**Keywords:** Automotive Laboratory, Seiri, Seiton, Seiso, Seiketsu, and Shitsuke.

Corresponding Author:

Ranu Iskandar  
 ranuiskandar.2018@student  
 .uny.ac.id

Received: 7 February 2020

Accepted: 9 March 2020

Published: 23 March 2020

Publishing services provided by  
**Knowledge E**

© Ranu Iskandar et al. This article is distributed under the terms of the [Creative Commons Attribution License](#), which permits unrestricted use and redistribution provided that the original author and source are credited.

Selection and Peer-review under the responsibility of the ICE-BEES 2019 Conference Committee.

## 1. Introduction

The learning activities carried out by UGM Vocational School of Mechanical Engineering are embodied in the Republic of Indonesia Law Number 20 (2003) Article 3 concerning on The National Education System stating that “National education aims to develop students’ potential so that they become human beings who believe and fear the Almighty God, who are noble, healthy, knowledgeable, capable, creative, independent, democratic and responsible as citizens. One of the ways to develop students’ potential is to take the practicum learning process in the laboratory.

 **OPEN ACCESS**

Laboratory is an academic support unit in educational institutions in the form of closed or open spaces, permanent or mobile labs, managed systematically for limited scale testing, calibration, and/or production, using equipments and materials based on certain scientific methods in the context of implementing education, research, and community service as set out in the Regulation of State Minister for Administrative Reform and Bureaucratic Reform Number 03 (2010) Article 1 Paragraph 3. According to Manik (2011), this existence of laboratory can improve the quality of learning process and education in general. Schools definitely must have a laboratory to support and develop students' skill in applying theories obtained in the classroom because theory and practice are inseparable.

UGM Vocational School has several departments. One of them is the Diploma of Mechanical Engineering. This department collaborated with *PT Indomobil Suzuki Internasional* to build Automotive Laboratory in 2002. *PT Indomobil Suzuki Internasional* did not only provide assistance in the form of equipments and lab materials but also laboratory design and training for instructors. The automotive lab applies 5S method in the workshop management, but in fact, there were problems during the initial observations, they are: the training kits was a mess. Based on the problem, the purpose of this study is identifying what the problems of implementing 5S in the automotive-laboratory are and how to solve them.

To improve the efficiency and effectiveness of the labs function, the work culture is necessary to apply. One of the popular work culture is 5S. 5S is originated from Japan. It stands for *Seiri* (Sort), *Seiton* (Set in Order), *Seiso* (Shine), *Seiketsu* (Standardize), and *Shitsuke* (Self-Discipline) which are used to organise and empower working areas (Ismara and Prianto, 2017).

Sort is the first 5S principle. This working principle is the principle of sorting goods. According to Imai (2008), the steps are: (a) work in process, (b) unnecessary tools, (c) unused machines, (d) defective products, and (e) letters and documents.

Set-in-order is the second phase of 5S principle. The concised items are organised in accordance with the storage and storing standard. According to Hirano (1995: 24-44) neatness includes the process of cleaning before tidying up, making storing plans, making sketch of storage, strategize the painting, drawing the floor lines, dividing lines, signs and labeling strategy. The three keywords are tidying, changing the storage from closed into open, and organising based on function.

*Seiso* is the third 5S principle. *Seiso* is cleaning phase. Imai (2008) explains that *Seiso* is the maintenance of the workplace to keep it clean.

*Seiketsu* is intended so that each individual can apply the three previous principles continuously. The implementation of this phase of maintenance will make the working environment well maintained continuously. According to Lamprea, Carreno, and Sanchez (2015), *seiketsu* includes the ease of distinguishing normal situations from abnormal ones by applying simple rules that are seen by all operators. To standardise, each member of the organisation must practice the first 3S continuously. To achieve this, it is necessary to design clearly and easily understandable visual controls (signs) which enable people to distinguish the right and wrong actions.

According to Imai (2008), *Shitsuke* or discipline is performed by obeying the procedures at work. Discipline emphasize the habit of behaving well and in accordance with the existing rules. This phase is more directed at establishing the awareness of each individuals to consistently implement the previous 4R. It is expected that each individuals can apply those principles even without being supervised/monitored.

## 2. Methodology

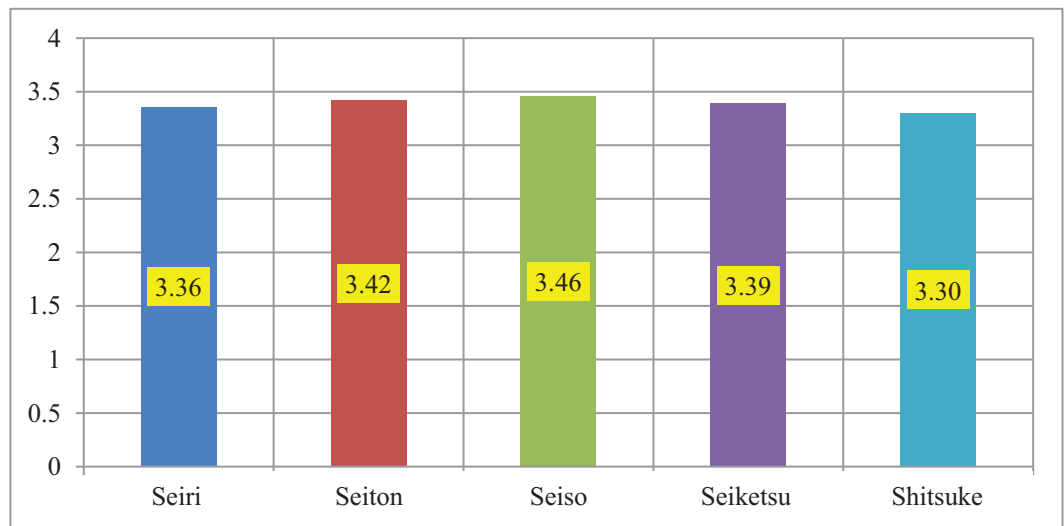
This study applied descriptive research. It is a case study in Automotive Laboratory of Mechanical Engineering at UGM Vocational School. Subjects research are equipments, practicum materials, program study secretary, and 4 educational staffs in the Automotive Laboratory. This research was conducted for a month in April 2019. The data collection technique of this research is by using some instruments: questionnaires, interviews, and observations. The data of interview results were analysed by reducing the data found, presenting data, and concluding (Milles & Hubberman, 1992). The reduction data was then narrated. The data of questionnaire results were analysed by scoring category from Widoyoko (2014).

TABLE 1: Category of questionnaire scores.

Achievement interval	Category
3.25 < average aspect score ≤ 4.00	Very Good
2.50 < average aspect score ≤ 3.25	Good
1.75 < average aspect score ≤ 2.50	Poor
0.00 < average aspect score ≤ 1.75	Bad

### 3. Results and Discussion

Data on the questionnaire distribution of 5S implementation in the Automotive Lab was analysed using scoring category. The finding of the analysis on 5S implementation in the Automotive Lab is shown in the following graphic in Figure 1.



**Figure 1:** Summary of the implementation result of 5S in the Automotive Lab.

The Graphic informed the implementation of 5S in the Automotive Laboratory of Mechanical Engineering at UGM Vocational School as Automotive Lab.

The score of *Seiri* showed 3.36 that means the attitude of educational staffs in the aspect of conciseness is very good. In the automotive laboratory, laboratory assistant and instructor dispose the garbage in its place and ensure equipment for practicum is in accordance with the needs and the learning process is punctual. The head of the laboratory exemplifies the implementation of *Seiri* starting from his own workplace. However, based on the observation, there are several motorbikes in the R4 room. This makes it not concised. The unused motorcycle should be in R2 or warehouse. Instructor 1 answered that the unused lab material should not be taken again by the infrastructure section. They cannot sell the unused materials because those belongs to university.

The possible solution in *Seiri* aspect is by reorganising the unused motorcycles based on the level of necessity. The unused motorcycles should be placed in warehouse. In addition, the lab staff can make request letters to the Facilities And Infrastructure Section to retrieve them. This is in line with the argument from Ismara & Prianto (2017) who states that the need for storage of the following items. Items that were not used last year should be discarded. Items that are used once in 6-12 months should be kept away. Items that are used once a month or week are stored in the middle of the workplace.

The score of *Seiton* showed that 3.42 that means the attitude of educational staffs in the aspect of tidiness is very good. The equipments and material for practicum in Automotive Lab is placed accordingly. The laboratory staffs and engineer can take the equipments and material quickly and precisely. The head of laboratory exemplifies in performing *Seiton* in the workplace.

The finding of the analysis showed that engine stands and trainer kits are not well organised. They are messy and mixed with each other. The trainer kits of room R2 is also stored with the trainer kits of room R4. That condition can be troublesome when taking the items. Instructor 1 said that there are some unused items which cause the engine stand and trainer kits untidy as it should be. The offered solution for *seiton* aspect is reorganising which items belongs to trainer kits R2, trainer kits R4, or engine stands. This is in line with Ismara & Prianto (2017) statement that visual control can be carried out by giving coloured label. Labels or colour signs later will be placed on the floor to give borders where to put trainer kit R2, trainer kit R4, and engine stand.

The score of *Seiso* showed 3.46 that means the attitude of educational staffs in the aspect of tidiness is very good. The cleaning tools in Automotive Laboratory is available. Instructor and laboratory assistant clean their workplace, they do not procrastinate their job, and the head of laboratory give exemplifies *Seiso* in the workplace. The observation result also shows that the floor is clean. Laboratory assistant 1 said that after practicum, the students tidy up the equipments and materials. They put thing back in its place and clean the workplace as well.

The score of *Seiketsu* (maintenance) showed 3.39 that means the attitude of educational staffs in the aspect of standardisation is very good. After the practicum in the automotive lab, the students return the equipments and materials. If there is missing item, students are obliged to take responsibility buying the new one, not just pay some cash to lab assistant. The head of the lab visits the automotive lab to check and give some guidance as he should do. The observation result showed that the equipments are taken care well. Dust cloth for cleaning is available, CCTV and medical kits are available as well. The lack of K3 posters or labels is only in evacuating sign/label. Whereas there are dustbin, high voltage switch, and the activities of practicum can cause accident not only for the students who carried out the practicum but also for environment.

The offered solutions are the need of posters for reminding students to return the practicum materials and equipments where it should be placed, to recheck them, to throw the garbage in dustbin, and some posters to show the students the written regulation in automotive laboratory. This is in line with Ismara & Prianto (2017) who

stated that visual aid is needed to help others do the job well. The visual should be static but when we see it, we are moved to obey the rule.

The score of *Shitsuke* (discipline) showed 3.30 that means the attitude of educational staffs in the aspect of discipline is very good. The laboratory assistants and instructors finish their job on time and responsive in fixing the problems about broken equipments and materials of practicum. However, laboratory assistants and instructors do not make 5S habits in the long term. Laboratory assistant said that UNY once gave workshop and instructor said that Suzuki Indo Mobil once did too.

The possible solution to do is by raising the incentive of tendering grants. Tendering grants is not only given to educational staffs who can make some innovation in his job but also are capable to achieve their job well. In addition, keeping harmonious communication and relationship among staffs and students by reminding or guiding one another about the importance of 5S so that they can increase awareness & discipline. This idea is supported by Ismara & Prianto (2017) who argue that habituation is necessary if we expect the best result.

## 4. Conclusion

The difficulties of implementing 5S in the Automotive Laboratory are 1) unused lab materials are not concised yet, 2) trainer kit and engine stand are not well-organised, 3) it necessary to add visual aids, especially K3, and 4) there is no long-term 5S habituation. Possible solutions to those problems are by 1) organising unused materials in accordance with the needs and storing them in the warehouse for materials which has never been used for years, while the necessary materials are placed in the middle of working area, 2) designing the placement of practicum material using colour labelling on the floor, 3) adding more K3 posters in automotive laboratory, and 4) increasing the tendering grants and establishing harmonious communication between educational staffs and students. The suggestion for improvement in the Automotive Laboratory of Mechanical Engineering at UGM Vocational School is expected to enhance the efficiency and effectiveness in the lab.

## Acknowledgement

Researcher would like to express gratitude to Mr. F.X. Sukidjo, M.T. as the Secretary of Mechanical Engineering at UGM Vocational School and educational staffs in the Automotive Laboratory.

## References

- [8] Republic of Indonesia Law Number 20 (2003) concerning on National Education System
- [2] Regulation of State Minister for Administrative Reform and Bureaucratic Reform Number 03 (2010) concerning on Employee Functional Position Laboratory of Education and The Credit Numbers.
- [3] Manik, A.F. (2011). Simulation Space Electrical Installation Workshop using Google Sketchup, B.A.. Thesis, Yogyakarta State University.
- [4] Ismara, I and Prianto, E. (2017). *Bagaimanakah agar Laboratorium dan Bengkel Pendidikan Vokasi menjadi NYAMAN, SELAMAT, dan SEHAT?*. Yogyakarta: UNY Press.
- [5] Imai, M. (2008). *The Kaizen Power*. (Translator: Sigit Prawato). Yogyakarta: Think.
- [6] Hirano, H. (1995). *Penerapan 5S di Tempat Kerja, Pendekatan Langkah-Langkah Praktis*. (Translator: Paulus A. Setiawan). Jakarta: PQM Consultants.
- [7] Lamprea, E.J.H., Carreno, Z.M.C., and Sanchez, P.M.T.M. (2015). Impact of 5S on Productivity, Quality, Organizational
- [8] Climate and Industrial Safety in Caucho Metal Ltda. *Ingeniare*. Revista chilena de ingeniería. Vol. 23, No. 1.
- [9] Miles, B. Mathew and Michael Huberman. (1992). Analisis Data Kualitatif Buku Sumber Tentang Metode-metode Baru. Jakarta: UIP.
- [10] Widoyoko, E.P. (2014). Teknik Penyusunan Instrumen Penelitian. Yogyakarta: Pustaka Pelajar.