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A Comparative Study of Soft Skills Among Grade X Industrial and Regular Class Students in the Automotive Fundamentals Subject Using an Authentic Assessment System at a Vocational High School in Sumedang, Indonesia

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Abstract

The development of soft skills has become a key requirement in 21st-century vocational education; however, the differences in soft skill attainment between the industrial track and the regular track at vocational high schools have not yet been empirically explained. The study attempts to examine the differences of soft skills among the students in the two classes in relation to authentic assessment through the 4C facets. The research used Posttest-Only Control Group design with 60 10th-grade students at a Vocational High School in Sumedang, Indonesia, using cluster probability sampling technique (industrial class n = 27; regular class n = 33). The instruments comprised of Likert scale questionnaires on soft skills, observation, and documentation of learning process. The data analysis procedures involved normality test, homogeneity test, independent t-test, and categorical analysis. There is no statistically significant difference in soft skills between industrial and regular classes ($t = 1.561$; $p = 0.127$). However, the mean of regular class is slightly higher (41.8) than that of industrial class (31.0). The categorical analysis shows that more number of students (93%) in the "Most Complete" (MC) category is found in industrial class compared to regular class (70%). These variations in competency among the classes show that soft skills are not determined by class type, but rather on the learning process, experience, and environment. The study supports the effectiveness of authentic assessment as a comprehensive evaluation tool and calls for more research using mixed methods and rubric-based performance assessment.

Keywords: Vocational High School Students' Soft Skills, Authentic Assessment, Industry-Based Classes, Regular Classes, 4C.

INTRODUCTION

In the current scenario, it has become necessary for students to possess soft skills in order to succeed in the workforce environment (Succi & Canovi, 2020; Ritter et al., 2018). Soft skills, such as the ability to communicate and collaborate, are crucial in making the graduates more competitive. This statement is backed by the findings of a study conducted by the National Association of Colleges and Employers (NACE, 2020) about soft skills needed by the workforce in 2021.

The development of soft skills in the learning process amid the conditions of the 21st century, the Fourth Industrial Revolution, and the Society 5.0 is meant to help ensure the principle of “learning for life,” thus giving meaning and value in the lives of students and their self-sustainability in the future. According to Law of the Republic of Indonesia No. 20 of 2003, education is defined as a planned process that creates the learning environment conducive for the development of potentials of students (Republic of Indonesia, 2023). The success of an individual in his/her professional activity will depend not only on the skills (hard skills), but also on interpersonal skills and soft skills that determine the level of

acceptance of an individual in the work environment (Afriani & Setiyani, 2015). According to Elfindri et al. (2011), soft skill is life skill and competence, either for self, for the group, for society, and for God. With soft skill, a person can become prominent in the society.

Based on the researcher's experience during the field survey at a Vocational High School in Sumedang, Indonesia, the researcher identified various issues that arose during the field survey process, particularly in the 10th-grade Industrial Class (Yamaha Special Class), including: (1) student attendance rates tended to fluctuate, with some students showing a lack of motivation to attend school. (2) Discipline among students in the industrial class was significantly lower compared to regular classes, even though instruction in the industrial class tends to place greater emphasis on discipline due to the instillation of industrial culture, such as strict start times, neat uniforms, and adherence to Standard Operating Procedures (SOPs). (3) A free-wheeling social environment, if not accompanied by further guidance, can give rise to negative peer groups and negatively impact students' enthusiasm for school. (4) Some students' communication remains passive, particularly during group discussions or presentations, whereas the establishment of the industrial class is intended to foster more focused and professional communication between students and teachers. (5) Teamwork among students in the industrial class is still lacking, as there are still some students who do not actively contribute to group projects.

The establishment of industry-based classes aims to bridge the gap between the educational process in schools and the skill requirements of the business and industrial sectors (DUDI). Such classes are supposed to result in graduates who are competent according to the requirements set forth by DUDI. The reasons why industrial classes should be established are as follows: (1) the need to make sure that graduates of Bhakti Nusantara Vocational High School become competent in their fields of specialization after joining the industry; (2) the need to reduce job turnovers due to incompetence in using the new technology provided by companies; and (3) the need to make sure that students do not get surprised upon joining DUDI, especially concerning the rules and work culture existing in the industry. This is due to the fact that despite having been trained through Industrial Work Practice, students still lack exposure to the work culture in the industry.

The reason why "Fundamentals of Automotive Technology" course was chosen to be the subject of research is that the course features qualities that can foster students' soft skills development. Within the learning process, students not only study theoretical material, but they are also actively engaged in practical activities like working with instruments, collaboration in groups, and problem-solving. Such practical activities allow students to

develop the ability to collaborate within a team, to communicate effectively in discussion and coordination, and think critically when solving complex problems of automobile technology. That is why “Fundamentals of Automotive Technology” can be considered a good means of developing soft skills.

METHOD

The research method used by the author in this study is the quantitative comparative method. This method is suitable for comparing two or more groups using measurable variables, as indicated by the title of this study. Comparative research is a research method aimed at comparing two or more phenomena or groups based on specific variables, without applying any treatment or manipulation to those groups (Arikunto, 2010). The research design to be used in this study is the Posttest-Only Control Group Design. According to Campbell & Stanley (1963), the Posttest-Only Control Group Design is a type of true experimental design used to measure the effect of a treatment or intervention without conducting a pretest beforehand.

The sample in this study consists of a subset of the population that possesses specific characteristics relevant to the research objectives. According to Sugiyono (2019), a sample is a subset of a population that shares the population’s characteristics. The sampling technique used is probability sampling with a cluster sampling approach. The study sample consists of two classes: the regular TSM A class with 33 students and the industrial class (KKY) with 27 students. The industrial class (KKY) was designated as the experimental group, while the regular class served as the control group. Thus, the total number of participants in this study was 60 students.

The data collection techniques used in this study included a posttest consisting of 12 essay questions; scores were determined using a 5-point Likert scale. Essay questions and the Likert scale are actually two different types of questionnaires, and essay questions cannot be calculated directly using the Likert scale formula; however, they can still be scored using the Likert scale formula by first converting them into numerical scores based on the ratings (Moffat, 2015). In this study, the researcher administered a questionnaire to students regarding soft skills, specifically the 4C competencies in the subject of automotive fundamentals, particularly the material on vernier calipers.

Calculate the initial percentage

Formula:

$$\mathrm{P} = \frac{F}{n} \text{ x } 100\%$$

Notes:

P = Percentage of student responses

F = Number of students who selected a particular option

N = Total number of students who responded (respondents)

Calculating the final percentage

Formula for the final percentage:

$$Presentage = \frac{Total\ percentage}{Number\ of\ questions}$$

(Ariyawati et al., 2017)

The survey was distributed during the 45th week of the even semester of the 2024/2025 academic year. Prior to the questionnaire distribution, students participated in several collaborative activities and learning projects. This was intended to ensure that respondents already had real-world experience related to the aspects being measured. In addition to using the questionnaire, this study employed documentation as one of the data collection methods to obtain secondary information that supports the research findings and the questionnaire distribution.

The data analysis techniques to be used in this research—a comparative study of the soft skills of 10th-grade vocational students and 10th-grade regular students—begin with collecting data and assigning scores to each item in the questionnaire, entering the raw scores into a table to facilitate calculations, and then conducting normality and homogeneity tests, as well as statistical tests (independent t-test and Mann-Whitney U test). The calculation formulas are as follows:

Normality Test Formula

Shapiro-Wilk Formula:

$$W - \frac{(\sum_{i-1}^{n} \alpha_i x_{(i)})^2}{\sum_{i-1}^{n} (x_i - \bar{x})}$$

(Shapiro & Wilk, 1965)

$x_i =$ Sorted data values

$\bar{x}_i =$ Sample mean

$\alpha_i =$ Constants based on covariance and normal variance

$W = Shapiro - wilk$ statistic value

Criterion: If the p-value is less than 0.05, then the data are not normally distributed.

Homogeneity Test Formula

Formula:

$$W - \frac{(N-k)}{(k-1)} \cdot \frac{\sum_i^k n_i (Z_i - Z_{..})^2}{\sum_{i-1}^k \sum_{j-1}^n (Z_{ij} - Z_{i\cdot})^2}$$

(Levene, 1960)

Description:

$Z_{ij} = \left|X_{ij} - \widetilde{X}_i\right|$ (deviation from the median or mean)

N = Total number of observations

k = Number of groups

n_i = Number of observations in the $- i\ th\ group$

Criteria: If the p-value is less than 0.05, then the variances are not homogeneous.

- Formula for the Independent Samples t-Test

Formula:

$$t = \frac{\overline{X}_1 - \overline{X}_2}{\sqrt{s_p^2 \left(\frac{1}{n_1} + \frac{1}{n_2}\right)}}$$

(Trachtman et al.,1978)

Description:

$\overline{X}_1, \overline{X}_2$ = The means of groups 1 and 2.

n_1, n_2 = The sample sizes of each group.

s_p^2 = *Pooled variance,* calculated as:

$$s_p^2 \frac{(n_1 - 1)s_p^2 + (n_2 - 1)s_p^2}{n_1 + n_2 - 2}$$

(Cressie & Whitford, 1986)

s_1^2, s_2^2 = Sample variances of each group.

RESULTS AND DISCUSSION

This section will show the results of the analysis of the data gathered through the research process, as well as discussions that connect the results with theory and existing literature within the framework of the research (see Table 1, Table 2, Figure 1, and Figure 2). The results will be presented in a systematic manner according to the research goals, which include the presentation of the data, their processing, and interpretation.

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Table 1. Posttest results for students in the industrial class and the regular class

Data	Class Category	
	Experimental (industrial)	Control (regular)
Minimum Value	12	30
Maksimum Value	57	55
Mean	31.0	41.8
Standard Deviation	10.2	7.24
Most Complete	25	23
Least Complete	63	47
Normality Test Results	Normal	Normal
Homogenity Test Results	Homogenitas	
t- Test Results	0.127 > 0.05, so H_{O1} is accepted and H_{11} is rejected	

Table 2. Percentage Results for Soft Skills Among Students in the Industrial Class and the Regular Class

Category Score	Soft Skill Percentage	
	Experimental (industrial)	Control (regular)
Most Complete (PL)	93%	70%
Least Complete (PTL)	233%	142%
Hypotesis Results	Experimental 93% > Control 70%, so H_{12} is accepted and H_{O2} is rejected	

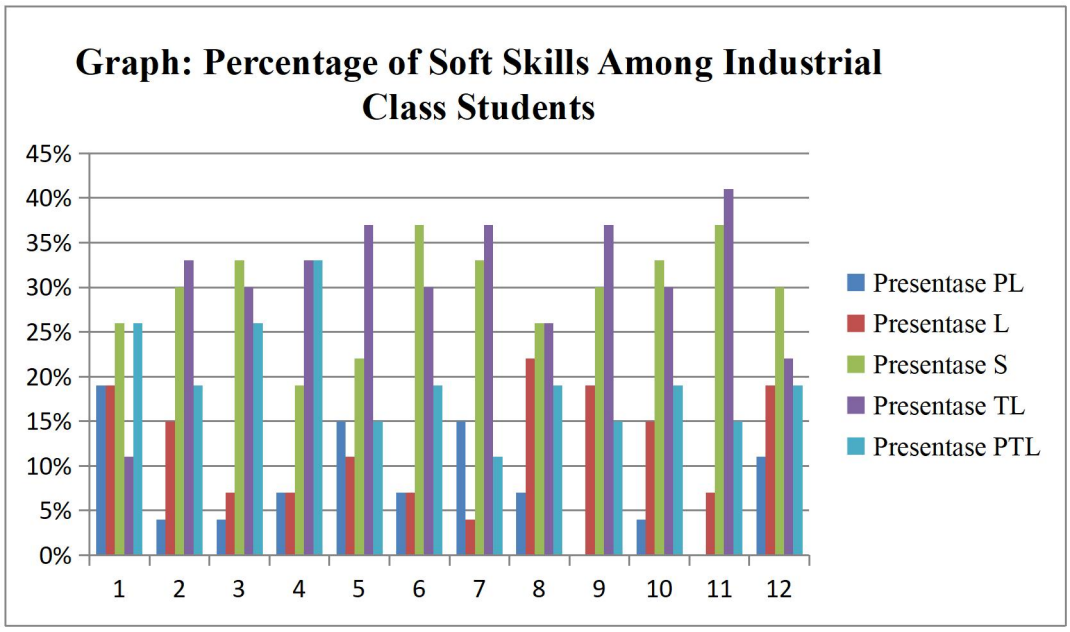

Figure 1. Percentage breakdown of soft skills among industrial-track students

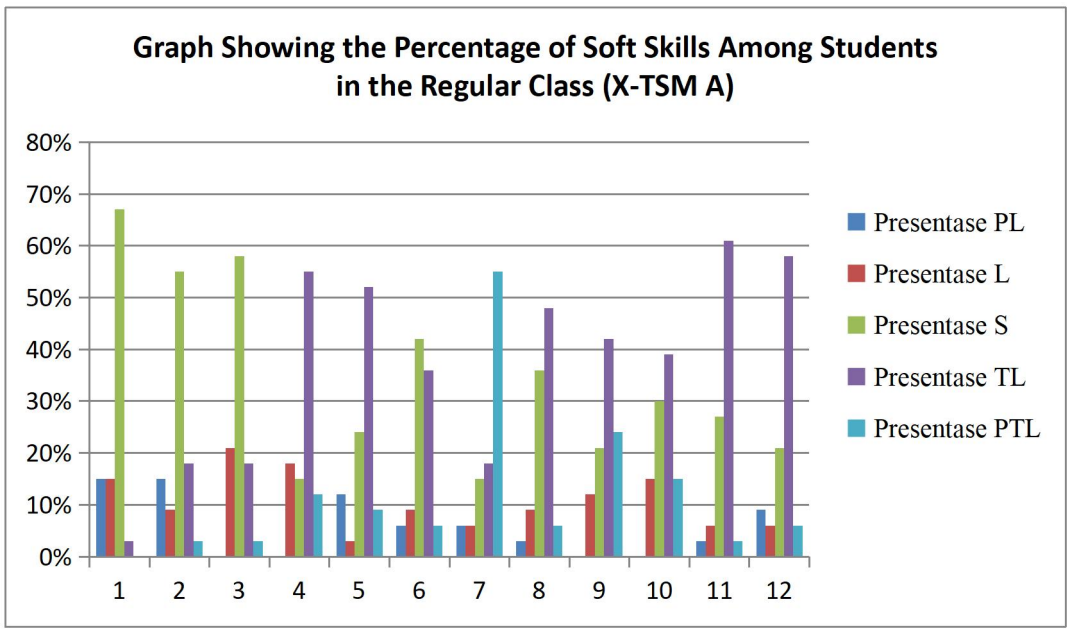

Figure 2. Percentage Distribution of Soft Skills Among Regular-Class Students

As presented in Table 1, the significance value is 0.127 which is more than 0.05 (Sig. > 0.05). Therefore, there is no statistically significant difference between the soft skills of the students from industrial class compared to the students from regular class. The mean of the soft skills scores for the regular class students is a little bit more than that of the industrial class students, but it is not sufficient enough to say that there is a statistically significant difference. Consequently, the null hypothesis (HO1), there is no statistically significant difference between the soft skills of 10th grade industrial class students and 10th grade regular class students in automotive fundamentals subject at a Vocational High School in Sumedang, Indonesia, is accepted. This is in line with the work done by Santosa et al. (2021) where they found out that class type does not influence the level of soft skills possessed by vocational high school students. Despite some variations in the soft skill scores of different students, none of them was statistically significant. Consequently, the findings of this study are corroborated by several other studies carried out previously, which found that variations in the environment of learning and class types do not matter when it comes to soft skills of the students.

According to Table 2, the percentage of students in the industrial class with the category “Most Complete” (PL) of soft skills was 93%, whereas the percentage of students in the regular class was 70%. Therefore, authentic assessment is regarded as an effective method to assess the soft skills of students in both the industrial and regular classes. Hence, hypothesis H12 is accepted, while hypothesis HO2 is rejected. This conclusion coincides with the position held by Mulyasa (2015) and Wiggins (1998), who noted that authentic

assessment is able to assess competencies comprehensively and equitably. According to Zubaidah (2016), authentic assessment is an effective tool for assessing 21st-century skills including the 4Cs without intergroup discrimination. Therefore, the findings of this research are consistent with numerous past studies, which concluded that authentic assessment could be applied objectively in different classroom settings and is appropriate to assess 21st-century skills including creativity, critical thinking, collaboration, and communication.

Alongside the questionnaire administered to the students, the researcher also made use of documentary research instruments in conducting this study. Processing of data from the documentary instruments was done through the collection and analysis of different kinds of documents related to basic automotive education. Analysis of the teaching modules was done in order to evaluate the lesson planning as well as the suitability of the developed materials. Student attendance sheets that were collected from teachers of a Vocational High School in Sumedang, Indonesia were utilized in determining the attendance rate of the students. Student test scores were also analyzed in order to evaluate the progress in terms of the quantitative learning outcomes of the students. Moreover, the documentation through pictures of activities conducted as well as questionnaires that were distributed acted as tangible evidence of the conduct of the learning process.

The results suggest that student involvement in industry courses has not yet resulted in a significant difference in the impact that has been exerted on the development of soft skills for students when compared to the normal courses. It is very possible that the development of students' soft skills is much more affected by other factors, including the teaching approaches used by the teachers and the learning environments, among others.

CONCLUSION

From the findings from authentic assessment, it can be observed that the soft skills among students from industrial and normal classes had different distribution ability levels based on their average score. The categories “S” and “TL” took the leading place among both classes. It is due to the fact of proper instructional design, involvement of students, competence acquisition and accurate record keeping of assessment process. Findings from the questionnaire analysis, using the Independent Samples t-Test, showed that there was a t-value of 0.127. There was no difference between the two classes in terms of their soft skill, thus the null hypothesis (HO1) is accepted. However, in the category “PL”, the percent of students who had the soft skill in industrial class was 93%, whereas in normal class it was 70%. This indicates that authentic assessment was effectively and evenly applied in both classes to evaluate students’ soft skills, and this supports the acceptance of hypothesis (H12).

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