

The Relationship of Students' Perceptions Regarding the Implementation of Industry-Based Teaching Factory on the Skills of Class XI Culinary Students of SMKN 1 Lembah Gumanti

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Abstract

This research was motivated by the sub-optimal implementation of the industry-based Teaching Factory in improving the skills of culinary skills program students at Vocational High Schools (SMK). This research aims to determine the relationship between students' perceptions regarding the implementation of industry-based Teaching Factory and the culinary skills of class XI SMKN 1 Lembah Gumanti. The research uses a quantitative approach with ex post facto correlational research. The research population consisted of 50 class XI students of the culinary skills program, with a sampling technique using total sampling, so that the entire population was used as the research sample. Data collection was carried out using a questionnaire that had been tested for validity and reliability. Data analysis includes descriptive statistics, normality test, linearity test, Pearson correlation test, simple linear regression analysis, and coefficient of determination. The research results show that the data is normally distributed and has a linear relationship. The results of the Pearson correlation test show that there is a significant relationship between students' perceptions of the implementation of industry-based Teaching Factory and students' culinary skills ($r = 0.295$; $p = 0.038 < 0.05$). Regression analysis produces the equation $Y = 62.527 + 0.364X$. Thus, it can be concluded that students' perceptions of the implementation of industry-based Teaching Factory have a positive and significant relationship to the culinary skills of class XI SMKN 1 Lembah Gumanti, although the level of relationship is relatively low.

Introduction

Vocational education has a strategic role in preparing human resources who have competencies in accordance with the needs of the business world and the industrial world (DUDI), especially in the era of the Industrial Revolution 4.0 which demands balanced mastery of technical and non-technical skills. Vocational High Schools (SMK) as vocational education institutions are required to produce graduates who not only master knowledge, but also have work competencies that are in line with industrial developments. However, the quality of vocational school graduates still faces various challenges, especially regarding the gap between the competencies possessed by students and the needs of the world of work. This condition is reflected in the still high unemployment rate for vocational school graduates compared to other levels of education, which indicates the need for innovation in the vocational learning process

(Huu et al., 2022; Kovalchuk et al., 2022; Mseleku, 2022). One approach developed to reduce this gap is the Teaching Factory (TEFA). This learning model integrates real production processes into learning activities so that students gain a learning experience that resembles a real work environment. Through the Teaching Factory, students not only learn theoretical concepts, but are also directly involved in the production process, quality control, time management, customer service, and solving problems commonly encountered in the industrial world. In this way, learning becomes more contextual and is able to increase the relevance of vocational education to job market needs (Kovalchuk et al., 2022; McGrath & Yamada, 2023; Fantinelli et al., 2024).

In the field of culinary expertise, the implementation of the Teaching Factory is becoming increasingly important because of the learning characteristics that require mastery of practical skills according to industry standards. Students are expected to be able to produce culinary products that meet aspects of quality, food safety, production efficiency, and service to consumers. Apart from improving hard skills, Teaching Factory-based learning also has the potential to develop soft skills, such as the ability to work together, communication, discipline, responsibility, creativity and the ability to make decisions. These competencies are an important part of the profile of vocational school graduates who are ready to enter the world of work or entrepreneurship (Rahmadhani & Suryati, 2022; Nofrita & Idrus, 2022; Kozlinska et al., 2023).

The success of implementing the Teaching Factory is not only determined by the availability of facilities, curriculum, and partnerships with industry, but is also influenced by students' perceptions of the learning process they experience. Positive perceptions can increase learning motivation, involvement in the learning process, and students' seriousness in developing their competencies. On the other hand, poor perceptions have the potential to reduce the effectiveness of learning so that the results obtained are not optimal. Therefore, student perceptions are an important factor that needs to be studied in evaluating the implementation of an industry-based Teaching Factory (Yoto et al., 2024; Sulaiman et al., 2025; Widoyoningrum, 2025).

Based on the results of initial observations at SMKN 1 Lembah Gumanti, it was found that the skills of students in the culinary skills program still did not fully meet industry standards. Some students still experience difficulties in implementing work procedures systematically, working according to time targets, maintaining product quality, or showing independence in practice. Apart from that, there are differences in student perceptions regarding the implementation of the industry-based Teaching Factory. Some students consider that this learning provides real work experience, while others still experience difficulties in adapting to industrial work culture (Jackson et al., 2022; Mohammed & Ozdamli, 2024; Singun, 2025). This condition shows that students' perceptions of the implementation of Teaching Factory are thought to be related to the skills they achieve during the learning process.

A number of previous studies reported that the implementation of the Teaching Factory was able to increase student competence, both in terms of technical skills, entrepreneurial skills and work readiness. Rejeki & Kuat (2023) stated that the Teaching Factory is effective in improving the entrepreneurial character of vocational school students. Other research shows that this model can improve culinary skills while fostering interest in entrepreneurship (Sutiadiningsih & Mahfud, 2023). Additionally, Suryati et al. (2023) stated that the Teaching Factory contributes to increasing students' technical, managerial and interpersonal competencies through learning that is oriented to industry needs. However, most previous research has

focused more on the effectiveness of Teaching Factory implementation, while research on the relationship between student perceptions of the implementation of industry-based Teaching Factory and student skills, especially in culinary skills programs in regional vocational schools, is still relatively limited.

Based on these conditions, there is a research gap that needs to be studied further, namely the lack of empirical evidence regarding the relationship between student perceptions of the implementation of industry-based Teaching Factory and student skills in the culinary skills program at SMKN 1 Lembah Gumanti. This research is expected to provide empirical information regarding the extent to which students' perceptions relate to their skills, so that it can be used as evaluation material in the development of industry-based learning in vocational schools.

Based on this description, this research aims to describe students' perceptions of the application of industry-based Teaching Factory and student skills, analyze the relationship between student perceptions of the application of industry-based Teaching Factory and the skills of class XI culinary students at SMKN 1 Lembah Gumanti, and determine the magnitude of the contribution of these perceptions to student skills.

Methods

Research Design

This study employed a quantitative approach using an ex post facto correlational research design to examine the relationship between students' perceptions of the implementation of an industry-based Teaching Factory and their vocational skills. A quantitative approach was selected because it enables the measurement of relationships between variables through statistical analysis, allowing objective interpretation of empirical data (Sugiyono, 2022). The ex post facto design was considered appropriate because the independent variable had already occurred naturally and was not manipulated by the researchers. Instead, the study investigated existing conditions to determine whether variations in students' perceptions were associated with differences in their vocational skills. As noted by Creswell and Creswell (2023), ex post facto studies are suitable for examining naturally occurring phenomena when experimental manipulation is neither feasible nor ethically appropriate. Furthermore, the correlational design allows researchers to determine the direction and strength of relationships between variables without implying causal inference. Consequently, this research focused on identifying the statistical relationship between students' perceptions of industry-based Teaching Factory implementation and their culinary competencies.

Research Setting and Participants

The study was conducted at SMKN 1 Lembah Gumanti, Solok Regency, West Sumatra, Indonesia, following the approval of the research proposal seminar and institutional permission from the school. The school was selected because it has implemented an industry-based Teaching Factory learning model within the Culinary Skills Program, making it an appropriate setting for investigating the relationship between students' perceptions and vocational competencies.

The target population consisted of all Grade XI students enrolled in the Culinary Skills Program during the 2025/2026 academic year. The population comprised 50 students, distributed across two classes (XI Culinary A and XI Culinary B). Because the population size was relatively small and accessible, this study employed a total sampling technique, in which every member

of the population was included as a research participant. According to Sugiyono (2022), total sampling is appropriate when the entire population is sufficiently small, thereby minimizing sampling error and increasing the representativeness of the findings. Consequently, the final sample consisted of 50 respondents, representing the entire population of Grade XI Culinary students at SMKN 1 Lembah Gumanti.

Research Variables and Operational Definitions

This study involved two research variables. The independent variable (X) was students' perceptions of the implementation of the industry-based Teaching Factory, whereas the dependent variable (Y) was students' vocational skills.

Students' perceptions were defined as the cognitive and affective evaluations of students regarding the implementation of Teaching Factory learning within their vocational education environment. This construct was operationalized through several dimensions, including (1) planning of industry-based learning activities, (2) implementation of production practices according to industrial standards, (3) evaluation of production outcomes, (4) compliance with standard operating procedures (SOPs), (5) industry participation in learning activities, (6) development of soft skills, and (7) preparation for workplace readiness.

Students' skills were operationalized as the competencies demonstrated by learners in performing culinary tasks according to vocational and industrial standards. This construct comprised two major dimensions. Hard skills included food preparation techniques, operation of kitchen equipment, product quality control, and practical production competencies. Soft skills encompassed communication, teamwork, discipline, responsibility, problem-solving, adaptability, and time management. These operational definitions ensured that each variable could be measured systematically through standardized research instruments.

Data Sources and Data Collection Procedures

The study utilized both primary and secondary data to obtain comprehensive information regarding the research variables. Primary data were collected through the administration of structured questionnaires distributed directly to all respondents. The questionnaires measured students' perceptions regarding the implementation of the industry-based Teaching Factory as well as their self-reported vocational skills.

Secondary data were obtained through documentation, including students' practical performance scores, Teaching Factory curriculum documents, lesson plans, industrial partnership records, assessment documents, and institutional reports related to Teaching Factory implementation. In addition, classroom and workshop observations were conducted to verify the actual implementation of Teaching Factory learning activities and to strengthen the interpretation of questionnaire findings through contextual evidence. Combining multiple data sources increased the credibility and completeness of the research data.

Research Instruments

The principal research instrument was a structured questionnaire using a five-point Likert scale, ranging from 1 (strongly disagree) to 5 (strongly agree). The instrument measuring students' perceptions initially consisted of 25 statement items developed from the conceptual dimensions of Teaching Factory implementation, including instructional planning, production practice, industrial standards, SOP implementation, industrial involvement, soft-skill development, and work readiness. Following empirical validation, 21 items satisfied the validity criteria and were retained for the final analysis.

The student skills questionnaire also comprised 25 items measuring both hard skills and soft skills relevant to culinary vocational competencies. After validity testing, 24 items met the required statistical criteria and were included in the final instrument. Higher scores on both instruments indicated more positive perceptions of Teaching Factory implementation and higher levels of vocational competency, respectively.

Instrument Validity and Reliability

Prior to the main data collection, the research instruments underwent validity and reliability testing to ensure measurement accuracy and internal consistency.

Construct validity was evaluated using the Pearson Product-Moment correlation coefficient, whereby each item was correlated with the total instrument score. Items with correlation coefficients exceeding the critical value at the 5% significance level were considered valid and retained for subsequent analysis.

Instrument reliability was assessed using Cronbach's Alpha, calculated with IBM SPSS Statistics version 26. The student perception instrument achieved a Cronbach's Alpha coefficient of 0.929, while the student skills instrument obtained a coefficient of **0.961**. Both values substantially exceeded the commonly accepted threshold of **0.70**, indicating excellent internal consistency and confirming that the instruments were highly reliable for measuring the intended constructs.

Data Analysis

Data analysis was performed using IBM SPSS Statistics version 26 through several sequential analytical procedures. First, descriptive statistical analysis was conducted to summarize the characteristics of each research variable using measures of central tendency and dispersion, including mean, median, mode, standard deviation, minimum score, maximum score, frequency distribution, and percentage.

Second, assumption testing was performed before hypothesis testing. The Shapiro–Wilk test was used to examine data normality because the sample size was fewer than 100 respondents. Data were considered normally distributed when the significance value exceeded **0.05**. Subsequently, a linearity test was conducted to verify whether the relationship between the independent and dependent variables was linear, using the significance value of Deviation from Linearity, where a value greater than 0.05 indicated that the assumption of linearity was satisfied.

Third, the research hypothesis was tested using the Pearson Product-Moment correlation coefficient, which measured the strength and direction of the relationship between students' perceptions of Teaching Factory implementation and their vocational skills. The magnitude of the correlation coefficient was interpreted according to Sugiyono's (2022) classification, while statistical significance was determined at the 5% significance level ($\alpha = 0.05$).

Finally, simple linear regression analysis was employed to estimate the predictive relationship between the independent and dependent variables. The regression equation was used to determine the extent to which changes in students' perceptions predicted changes in vocational skills. In addition, the coefficient of determination (R^2) was calculated to estimate the proportion of variance in students' skills explained by their perceptions of the implementation of the industry-based Teaching Factory. The remaining unexplained variance was interpreted as being attributable to other factors outside the scope of the present study.

Results and Discussion

This research involved 50 class XI students of the Culinary Skills Program at SMKN 1 Lembah Gumanti as respondents. Data analysis was carried out using descriptive statistics, analysis prerequisite tests, Pearson correlation test, simple linear regression, and coefficient of determination with the help of SPSS version 26.

Table 1. Statistical Calculation Results of Student Perceptions about Industry-Based Teaching Factories

Statistics		
Student Perceptions of Industry-Based Teaching Factory		
N	Valid	50
	Missing	0
Mean		83.9200
Std. Error of Mean		1.19210
Median		84.0000
Mode		80.00 ^a
Std. Deviation		8.42939
Variance		71.055
Range		39.00
Minimum		62.00
Maximum		101.00
Sum		4196.00
a. Multiple modes exist. The smallest value is shown		

Source: Research Results on Student Perceptions about Industry-Based Teaching Factory SPSS Version 26

The results of the descriptive analysis show that students' perceptions of the application of industry-based Teaching Factory have an average score of 83.92 with a standard deviation of 8.43, a minimum score of 62, and a maximum score of 101. Based on the score categorization, 52% of students are in the high to very high category, while 22% are in the medium category and 26% are in the low to very low category. These findings show that the majority of students gave a positive assessment of the implementation of the industry-based Teaching Factory at SMKN 1 Lembah Gumanti.

Table 2. Results of Statistical Calculation of Student Skills

Statistics		
Student Skills		
N	Valid	50
	Missing	0
Mean		93.1000
Std. Error of Mean		1.47392
Median		96.0000

Mode	96.00
Std. Deviation	10.42221
Variance	108.622
Range	51.00
Minimum	66.00
Maximum	117.00
Sum	4655.00

Source: SPSS Student Skills Research Results Version 26

In the student skills variable, an average score of 93.10 was obtained with a standard deviation of 10.42, a minimum score of 66, and a maximum score of 117. The distribution of categories showed that 70% of students were in the very high category and 8% were in the high category, so that overall 78% of respondents had skills in the high to very high category. These results indicate that the majority of students have good culinary skills, both in the hard skills and soft skills aspects.

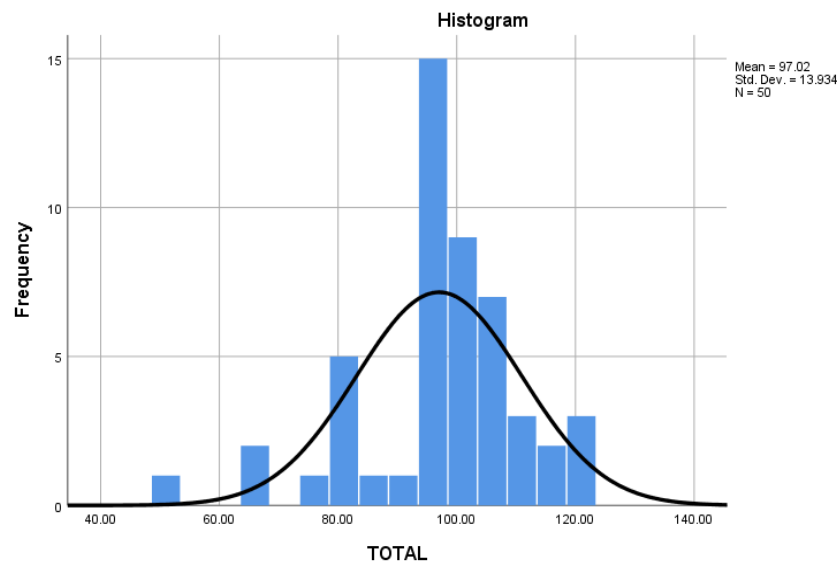


Figure 1. Normal Curve Histogram of Student Skills Data Distribution

Source: SPSS Version 26 data processing results

Based on the distribution histogram of the Culinary Skills of SMK Negeri 1 Gumanti Valley, it shows a curved shape. This proves that the data collected from 50 respondents has a normal distribution. The following is an overview of the categorization of Class XI Culinary Student Skills data at SMKN 1 Gumanti Valley. Before testing the hypothesis, the data is first tested using the normality test and linearity test. The results of the Shapiro–Wilk test show a significance value of 0.407 ($p > 0.05$), so the data is normally distributed. Furthermore, the results of the linearity test show a deviation from linearity value of 0.918 ($p > 0.05$), which shows that the relationship between student perceptions of the application of industry-based Teaching Factory and student skills is linear. Thus, all parametric analysis assumptions have been met.

Table 3. Normality Test Results Using the Shapiro-Wilk Test

Tests of Normality						
	Kolmogorov-Smirnov ^a			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Unstandardized Residual	.111	50	.171	.976	50	.407
a. Lilliefors Significance Correction						

Source: Normality Test Results Using Shapiro-Wilk SPSS Version 26 Test

Hypothesis testing using Pearson correlation produces a correlation coefficient of $r = 0.295$ with a significance value of 0.038 ($p < 0.05$). These results show that there is a positive and significant relationship between students' perceptions of the implementation of industry-based Teaching Factory and students' skills. The correlation coefficient value indicates that the relationship is in the low category, but is still statistically significant.

Table 4. Linearity Test Results of Student Perception Variables about Industry-Based Teaching Factory and Student Skills

ANOVA Table							
			Sum of Squares	df	Mean Square	F	Sig.
X* Y	Between Groups	(Combined)	2307.583	26	88.753	.677	.832
		Linearity	462.087	1	462.087	3.525	.073
		Deviation from Linearity	1845.496	25	73.820	.563	.918
	Within Groups		3014.917	23	131.083		
	Total		5322.500	49			

Source: Linearity Test Results of Student Perception Variables about Industry-Based Teaching Factory and Student Skills SPSS Version 26

Simple linear regression analysis produces the equation:

$$Y = 62,527 + 0,364X$$

The regression coefficient of 0.364 shows that every one unit increase in student perception towards the implementation of industry-based Teaching Factory is followed by an increase in student skills of 0.364 units. The t test value of 2.136 with a significance of 0.038 ($p < 0.05$) indicates that student perceptions have a significant effect on student skills. The results of the analysis of the coefficient of determination show an R^2 value of 0.087, which means that students' perceptions of the application of industry-based Teaching Factory contribute 8.7% to the variation in student skills, while the remaining 91.3% is influenced by other factors outside the research model.

Students' Perceptions of the Implementation of Industry-Based Teaching Factory

The research results show that the majority of students have a positive perception of the implementation of the industry-based Teaching Factory. These findings indicate that the implementation of learning that integrates work culture, real production processes and

industrial operational standards is well received by students. Learning experiences that resemble real working conditions provide students with the opportunity to understand work processes more contextually, thereby increasing their involvement in learning activities. These results are in line with research by (Jing et al., 2023; Widoyoningrum, 2025; Putri et al., 2026) which states that Teaching Factory-based learning is able to increase authentic learning experiences while strengthening students' readiness to enter the world of work.

The students' skills in this study were also in the high to very high category. These conditions show that the implementation of the Teaching Factory not only supports the mastery of technical skills, such as food processing, equipment use, and quality control, but also develops non-technical skills in the form of communication, cooperation, discipline, responsibility, and time management. These findings support the research results of (Tanjung et al., 2025; Setiadi et al., 2025; Yamin, 2026) who explained that Teaching Factory-based learning provides practical experience that is able to improve students' work competencies according to industry standards. Pearson correlation analysis shows that there is a positive and significant relationship between student perceptions of the application of industry-based Teaching Factory and student skills ($r = 0.295$; $p = 0.038$). Even though the strength of the relationship is classified as low according to Sulaiman et al. (2025) criteria, these results indicate that the more positive the student's perception of the implementation of Teaching Factory, the better the skills they have. These findings strengthen the research results of Cahyaningati et al. (2024) and Indrastana et al. (2023) who state that positive perceptions of the vocational learning environment contribute to increasing student competency.

The results of simple linear regression show that student perceptions have a significant effect on student skills. The regression equation $Y = 62.527 + 0.364X$ indicates that an increase in positive perceptions of the Teaching Factory is followed by an increase in student skills. Theoretically, these results support the concepts of experiential learning and contextual teaching and learning which place authentic learning experiences as an important factor in forming student competencies. Through direct involvement in production activities, students have the opportunity to connect the concepts learned with real work practices so that their competencies become more meaningful and relevant to industry needs (Prianto et al., 2022; Supriati et al., 2022; Fitrianto & Farisi, 2025).

However, the coefficient of determination value of 8.7% shows that student perception is not the only factor that influences skills. Most of the variation in student skills (91.3%) is influenced by other factors, such as teacher competency, quality of practical facilities and infrastructure, intensity of partner industry involvement, learning motivation, practical field work experience, and individual student characteristics. Therefore, improving the quality of Teaching Factory learning needs to be followed by strengthening various supporting factors so that student competency development can take place optimally (Kuat & Noor, 2023; Wahjusaputri et al., 2023; Setiadi et al., 2025).

Practically, the results of this research provide the implication that schools need to maintain and improve the quality of implementing industry-based Teaching Factory through strengthening partnerships with the business world and industry, providing practical facilities that comply with standards, and increasing teacher competency in managing production-based learning. Apart from that, regular evaluation of student perceptions is also important as a basis for program improvement so that the implementation of Teaching Factory can have a greater impact on improving the skills of vocational school graduates (Yan et al., 2023; Chai et al., 2024; Akram & Abdelrady, 2025).

Conclusion

This research shows that students' perceptions of the implementation of industry-based Teaching Factory at SMKN 1 Lembah Gumanti are in the relatively high category, while culinary students' skills are generally in the very high category. The results of statistical analysis show that there is a positive and significant relationship between students' perceptions of the implementation of industry-based Teaching Factory and students' skills. This indicates that the more positive the student's perception of the implementation of the Teaching Factory, the better the skills they have, both in terms of technical skills (hard skills) and non-technical skills (soft skills). Simple linear regression analysis shows that students' perceptions of the implementation of industry-based Teaching Factory have a significant effect on students' skills. However, the coefficient of determination value of 8.7% shows that students' skills are not only influenced by perceptions of the Teaching Factory, but also by various other factors, such as teacher competence, quality of facilities and infrastructure, learning motivation, practical experience, as well as the involvement of the business and industrial world in the learning process. The findings of this research have the implication that schools need to continue to improve the quality of implementing industry-based Teaching Factory by strengthening partnerships with the business world and industry, providing practical facilities that comply with industry standards, and increasing teacher competency in managing production-based learning. Apart from that, evaluation of student perceptions needs to be carried out periodically as an indicator in developing the Teaching Factory program so that it can provide a more optimal contribution to improving students' skills.

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