The Connection Between Knowledge and Skills in the Cookie Domain within Pastry and Bakery Programs

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ABSTRACT

This study aims to analyze the relationship between students' knowledge and skills in cookie making at SMK Negeri 3 Klaten. The research method used is quantitative correlational, with a purposive sample of 35 students from Class XII Boga 1. Data were collected through knowledge tests and performance assessments. The average knowledge score was 78, while the average skill score was slightly higher at 82.9. Statistical analysis showed a very strong positive correlation of 0.963 between knowledge and skills, significant at the 0.05 level. These results indicate that students' theoretical understanding of cookies greatly influences their practical skills in cookie making. The validity and reliability of the instruments were tested using factor analysis and Cronbach's Alpha to ensure data accuracy. This study emphasizes the importance of vocational education that integrates theory and practice to better prepare students for careers in the culinary field. The implications of this study highlight the need for more effective teaching strategies that combine knowledge acquisition with skill development. By enhancing these two aspects, student learning outcomes in pastry and bakery subjects can be improved, potentially reducing unemployment rates among vocational school graduates.

Keywords: Cookies, skills, knowledge, vocational high school

INTRODUCTION

The establishment of Vocational High Schools (SMK) aims to develop skills in a particular field to prepare students to enter the workforce as productive individuals and to grow into job creators through entrepreneurship (Pemendikbud Number 34 of 2018). Graduates of Vocational High Schools (SMK) are expected to have the individual ability to work and engage in entrepreneurship in their chosen field, which is the core of vocational education (Sutikno, 2013; Tauhid, 2022).

The general objective of vocational education focuses on its primary function: preparing students to work in specific fields (Hanafi, 2013). However, according to the Official Statistics Report published by the Central Statistics Agency in May 2020, the open unemployment rate for SMK graduates decreased from 8.92% in 2018 and 8.63% in 2019 to 8.49% in 2020. Despite the annual decrease, SMK graduates contribute the most to the open unemployment rate compared to other educational levels (Satria, 2024). Referring to the 2013 curriculum, the competencies of SMK graduates are a combination of knowledge, attitude, and skills, reflecting behavioral changes from the learning process that enable them to perform specific tasks with the abilities required by the workforce or industry (Sari, 2023; Subjianto et al., 2020). This study was conducted to examine the relationship between knowledge and skills because the assessment process for

these aspects is systematically carried out for each KD, with scores presented numerically, allowing for statistical analysis of their relationship. Understanding the relationship between knowledge and skills can help teachers develop the media and learning methods used. Meanwhile, attitude assessment is conducted through teacher observation of student behavior, which does not affect the use of learning methods and media.

Mubarak (2011) defines knowledge as everything that a person knows through personal experience. According to Bloom's theory, knowledge is the understanding of something according to its meaning through perception. After cognitive and affective learning outcomes, there are psychomotor learning outcomes. The preparation, processing, and final results of completed tasks form the basis for assessing psychomotor or skill learning outcomes (Djazari and Sagoro, 2011).

The Pastry and Bakery Product Subject is one of the productive training subjects in the Tourism Vocational High School's Culinary Arts program (Sari, 2019). The role of the productive subject teacher is to provide learning material prepared in the Lesson Implementation Plan (RPP), which includes competency standards, basic competencies, competency achievement indicators, learning objectives, teaching materials, time allocation, and learning methods (Joko, 2021). Student learning outcomes in the Pastry and Bakery Product Subject at SMK Negeri 3 Klaten have not yet met the expected Minimum Completeness Criteria (KKM) of 70. This is evident from the test scores of Class XI students in the Pastry and Bakery Product Subject, where 19 out of 36 students (53%) scored below the KKM. Student learning outcomes obtained through the assessment process can be influenced by the methods and media used in learning (Saputra et al., 2020).

Cookie material is one of the topics studied in the Pastry and Bakery Product Subject. The achievement indicators for the Basic Competency (KD) of cookie material include the definition of cookies, cookie classification, tools and ingredients for making cookies, cookie-making stages, criteria for good cookies, and making various types of cookies in the Pastry and Bakery Product Subject Syllabus for Class XI at SMK Negeri 3 Klaten. The choice of cookie material as the research object is due to cookies being a popular product in the pastry world, the diverse skills required in cookie-making, and the wide variety of cookies, allowing researchers to explore different types of cookies for assessing student skills and providing an understanding of the skills needed in the pastry industry.

Cookie material was chosen as the focus of this research because it has several advantages relevant to the learning objectives at SMK. First, cookies are a popular product in the pastry world, making mastery of cookie-making techniques highly beneficial for students pursuing careers in the culinary industry. Second, cookie-making involves various skills, from ingredient selection and mixing techniques to baking temperature control, all of which are essential competencies in the pastry and bakery field. Third, the diverse variety of cookies allows students to explore creativity and innovation in product creation, enhancing their practical skills. Fourth, cookies have a broad market potential, so cookie-making skills can support students in entrepreneurship. Therefore, cookie material provides an ideal opportunity to measure the relationship between students' theoretical knowledge and practical skills. Students' knowledge of cookie material is expected to be measured through the competency achievement indicators set in the syllabus, which include definitions, classifications, and cookie-making techniques (Kurniawan et al., 2021).

Several studies have investigated the relationship between knowledge and skills in various fields. Research conducted by Laviana (2021) found a relationship between knowledge and practical results in fashion-making among SMK students. Research by Hakim et al. (2022) on the contribution of theoretical learning outcomes to practical skills in lathe machining also showed a relationship between the two. Akmal's (2018) research on the relationship between mastery of yeast dough theory and practical bread-making results in SMK showed a strong relationship between theoretical mastery and students' practical results. Raharjo's (2016) research on the relationship between theoretical understanding and work facilities with

practical achievements in milling techniques showed that theoretical understanding, work facilities, and students' practical achievements are interrelated.

Several studies have discussed the relationship between students' knowledge and skills in various fields. However, there has been no research on the relationship between students' knowledge and skills in the Pastry and Bakery Product Subject, specifically cookie material. Therefore, this study aims to examine the relationship between knowledge and skills in cookie material in the Pastry and Bakery Product Subject at SMK Negeri 3 Klaten.

Students' knowledge of cookie material is one of the assessment competencies aimed at measuring students' cognitive abilities in cookie material. The cognitive domain competency achievement indicators for cookie material in the learning syllabus include the definition of cookies, cookie classification, tools and ingredients for cookie-making, stages of cookie-making, and criteria for good cookies. Students' skills in cookie material are one of the assessment competencies at SMK aimed at determining students' abilities in performing tasks in cookie-making practice. The skill domain competency achievement indicators for cookie material in the syllabus include making various types of cakes from cookie dough (Pastry and Bakery Product Subject Syllabus for Class XI at SMK Negeri 3 Klaten).

This study aims to identify the relationship between students' knowledge and skills in cookie material in the Pastry and Bakery Product Subject at SMK Negeri 3 Klaten. Therefore, the results of this study are expected to provide insights for educators in developing more effective learning strategies to enhance students' competencies comprehensively.

METHOD

This study is a quantitative correlational research using nonparametric inferential statistical methods. It was conducted to determine the relationship between two variables: knowledge and skills.

Participants

The population in this study consists of students at SMK Negeri 3 Klaten who have completed the cookie material in the Pastry and Bakery Product Subject. Observations showed that the students who studied the cookie material were in Class XII, divided into 4 classes with a total of 142 students. The sample was determined using purposive sampling, resulting in a sample of 35 students from Class XII Boga 1. The sample size of 35 students was determined based on Krejcie and Morgan's (1970) table, which provides sample sizes for specific populations with a 95% confidence level and a 5% margin of error.

Data Collection and Analysis

Data collection in this study used knowledge tests and performance assessments. The knowledge test was used to assess students' knowledge of cookie material, based on the competency achievement indicators in the subject syllabus. The knowledge test consisted of 22 multiple-choice questions with 4 answer options. Performance assessment was conducted to evaluate students' practical skills in cookie-making, from preparation to the final product. The instruments used were adopted from previous studies by Laviana (2021) and Akmal (2018), which have been proven valid and reliable in the vocational education context.

The knowledge test, consisting of multiple-choice questions, was designed based on competency achievement indicators in the syllabus. This type of test was chosen for its ability to objectively and systematically measure students' cognitive understanding. The validity of the instrument was tested using factor analysis, while its reliability was tested with Cronbach's Alpha, yielding satisfactory results.

Performance assessment was conducted by observing students' skills during the cookie-making practice, from preparation to the final product. The assessment used a Likert scale from 1 to 5, where 1 indicates very poor skills and 5 indicates excellent skills.

Data analysis techniques began with descriptive statistical analysis, including calculating the average score, class interval calculation, and determining the variable tendency table. Hypothesis testing in this study used Spearman rank correlation. Sugiyono (2019) states that data in Spearman rank correlation tests are ordinal for both variables and do not need to be normally distributed.

Prerequisite analysis tests were conducted using the Kolmogorov-Smirnov normality test and Levene's test for homogeneity of variance. The normality test results showed that the data were not normally distributed, so the analysis continued with nonparametric techniques. The homogeneity of variance test showed that the variance among groups was homogeneous, validating the use of Spearman Rank correlation analysis.

The decision on the correlation between knowledge and skills variables can be concluded by examining the significance value obtained. If the Sig. value is less than 0.05, it can be concluded that there is a relationship between the two variables. The relationship between the two variables becomes stronger as the correlation coefficient value approaches a certain number.

Table 1. Correlation Strength Levels

Correlation Coefficient Value	Correlation Strength
0.00 - 0.25	Very weak
0.26 - 0.50	Moderate
0.51 - 0.75	Strong
0.76 – 0.99	Very strong
1.00	Perfect

FINDINGS AND DISCUSSIONS

Descriptive Analysis of Knowledge Test

The results of the students' knowledge test on cookie material showed a highest score of 91, a lowest score of 64, and an average score of 78. Based on Table 2 and Figure 1, the frequency of students' knowledge on cookie material mostly falls within the class interval of 77.5-81, with 16 students (46%).

Table 2. Frequency Distribution of Cookie Material Knowledge

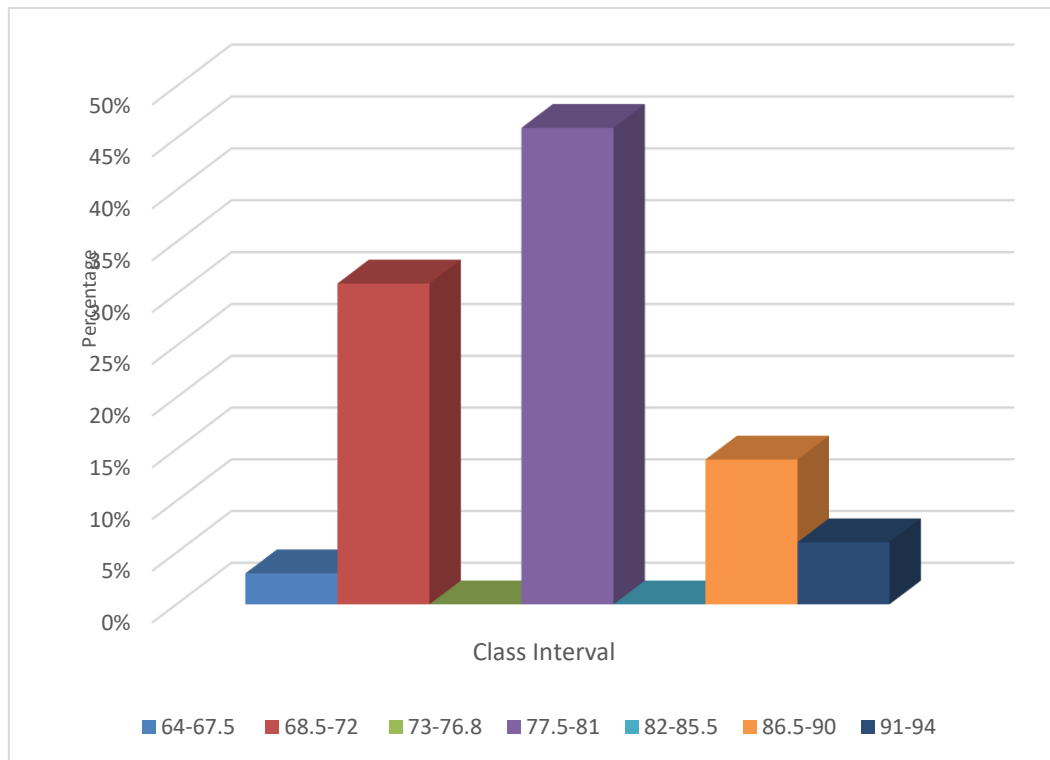| Class Interval	Frequency	Percentage
64 - 67.5	1	3%
68.5 - 72	11	31%
73 - 76.8	0	0%
77.5 - 81	16	46%
82 - 85.5	0	0%
86.5 - 90	5	14%
91 - 94	2	6%
Total	35	100%

Figure 1. Percentage Frequency of Cookie Material Knowledge

The results of the students' knowledge test on cookie material showed a diverse distribution of scores. The highest score achieved was 91, while the lowest was 64, with an overall average of 78. Table 2 shows the frequency distribution of students' knowledge scores. Sixteen students (46%) fell within the class interval of 77.5-81, indicating the largest concentration in this range. Table 3, which classifies knowledge tendencies, shows that the majority of students (15 students or 43%) are in the "Good" category. Although the average indicates a fairly good understanding, the presence of students with below-average scores highlights the need for more differentiated learning strategies to reach all students. This aligns with the importance of effective vocational education that not only focuses on theory but also integrates hands-on practice relevant to students' areas of expertise (Wardina et al., 2019). It is also important to consider that interactive and experience-based learning methods, such as project-based learning or inquiry-based learning, can enhance students' practical skills (Varadarajan & Ladage, 2022; King et al., 2016).

Table 3. Knowledge Tendency Distribution of Cookie Material

Class Interval	Category	Frequency	Percentage
x ≥ 87	Very Good	2	3%
87 > x ≥ 79	Good	15	31%
79 > x ≥ 72	Fairly Good	8	0%
x < 72	Poor	10	0%
Total		35	100%

Based on Table 3, the majority of students' knowledge scores on cookie material fall into the "Good" category, with 15 students (43%).

Descriptive Analysis of Performance Assessment

The results of the performance assessment of practical cookie-making skills showed a highest score of 94, a lowest score of 74, and an average score of 82.9.

Table 4. Frequency Distribution of Cookie Material Skills

Class Interval	Frequency	Percentage
74-76	10	29%
77-79	0	0%
80-82	5	14%
83-82	5	14%
86-88	5	14%
89-88	5	14%
92-94	2	14%
Total	35	100%

Based on Table 4, the majority of students' skills in cookie material fall within the class interval of 74-76, with 10 students (29%). Based on Table 5, students' skills in cookie material in the "Very Good," "Fairly Good," and "Poor" categories have the same frequency, with 10 students each (29%). Figure 2 presents a visual bar chart of these percentages. The visual highlights the peak at the 74-76 interval and the absence of students in the 77-79 interval. The consistent percentages for the intervals 80-82 through 89-91 would be shown as bars of equal height, and the lower percentage for the 92-94 interval would be a shorter bar. Each of these intervals has a frequency of 5 students, accounting for 14% of the total each. This uniform distribution suggests that students' skills are spread relatively evenly across these intervals, except for the gap at 77-79.
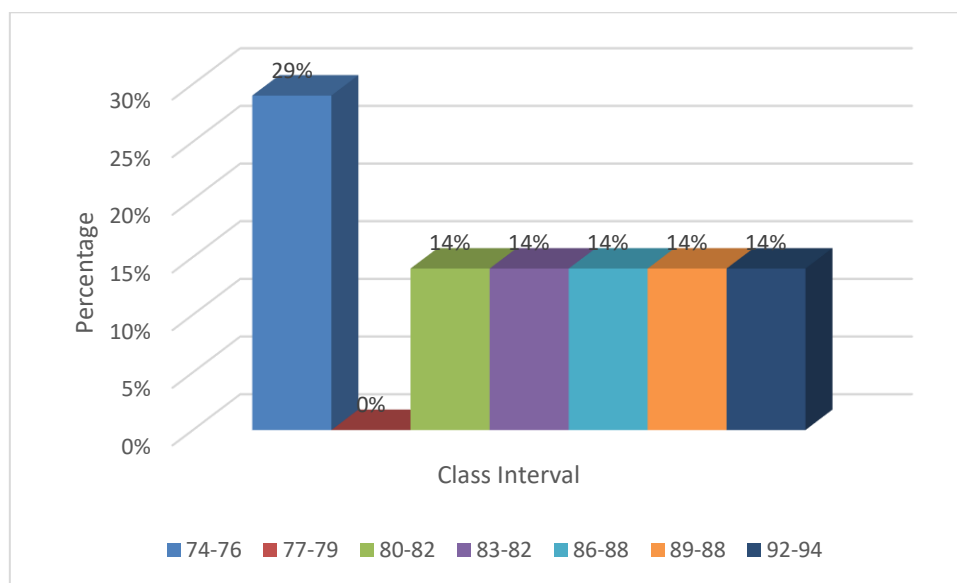

Figure 2. Percentage Distribution of Cookie Material Skills

The performance assessment of practical cookie-making skills showed a highest score of 94 and a lowest score of 74, with an average of 82.9. Table 4 displays the frequency distribution of skill scores. Ten students (29%) fell within the class interval of 74-76, which is the largest group. Table 5 classifies skill tendencies. Interestingly, the "Very Good," "Fairly Good," and "Poor" categories have the same frequency (10 students or 29% each). This indicates a disparity in skill mastery among students, although the average shows overall good performance. These results highlight the importance of training programs that prioritize practical skills and involve various stakeholders, such as industry and educational institutions, to enhance student competence (Wu, 2015). Furthermore, previous practical experience and the learning methods used also play a crucial role in shaping students' skills (FU, 2024).

Table 5. Skill Tendency Distribution of Cookie Material

Class Interval	Category	Frequency	Percentage
x ≥ 89	Very Good	10	29%
89 > x ≥ 84	Good	5	14%
84 > x ≥ 79	Fairly Good	10	29%
x < 79	Poor	10	29%
Total		35	100%

Hypothesis Testing

The results of hypothesis testing using Spearman rank can be seen in Table 6. Based on Table 6, the obtained significance value is 0.000, indicating that the knowledge and skills variables are correlated because 0.000 < 0.05. The table shows a correlation coefficient of 0.963. The correlation coefficient value indicates that the research data has a very strong correlation.

Table 6. Hypothesis Testing Results

Correlation			Knowledge	Skills
Sperman'sho	Knowledge	Correlation coeffcient Sig. (2-Tailed)	1000	0.963**
				0.000
		N	35	35
	Skills	Correlation coeffcient Sig. (2-Tailed)	0.963	1.000
			0.000	0.000
		N	35	35

**. Correlation is significant at the 0.01 level (2-tailed).

Hypothesis testing using Spearman Rank correlation (Table 6) shows a significance value of 0.000. Since this value is less than 0.05, there is a significant correlation between the knowledge and skills variables. A correlation coefficient of 0.963 indicates a very strong relationship between students' knowledge and skills in cookie material. These findings support the idea that good theoretical mastery contributes to success in practice (Boonsri et al., 2019) and aligns with the goals of vocational education to produce graduates with knowledge and skills relevant to industry needs (Ali et al., 2017). These results also emphasize the importance of integrating theory and practice in vocational education curricula (Almetwazi et al., 2020; McKenzie & Mellis, 2017). A balanced curriculum between theory and practice will better prepare students to face challenges in the workforce ("Research on Issues Related to Lifelong Vocational Skills Training for Vocational Undergraduate Teachers," 2023).

CONCLUSION

This study examined the relationship between knowledge and skills in cookie-making among 35 twelfth-grade culinary students at SMK Negeri 3 Klaten. Students demonstrated good theoretical understanding (average score of 78) and high practical skills (average score of 82.9). A strong positive correlation ($r = 0.963$, $p < 0.000$) was found between knowledge and skills, highlighting the importance of integrating theory and practice in culinary education. The findings suggest a need for balanced curriculum design and differentiated instruction to address individual student needs and improve overall competency, ultimately enhancing employability in the culinary industry. While this study provides valuable insights into the relationship between knowledge and skills in cookie-making, further research could explore the effectiveness of specific teaching methods in enhancing both knowledge and skills. Investigating the impact of different pedagogical approaches on student learning outcomes would be beneficial. Additionally,

expanding the study to include a larger and more diverse sample of students from different culinary schools could enhance the generalizability of the findings.

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