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Analysis of Factors Increasing Creative Thinking in Vocational Education

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A B S T R A C T

Creative thinking is a crucial competency in vocational education, especially in facing the challenges of the dynamic aviation industry. This study aims to analyze the factors that influence the improvement of creative thinking skills of vocational education students at the Surabaya Aviation Polytechnic. This study uses a quantitative approach to analyze the relationship between variables, with a sample of 100 students taken using a simple random sampling technique from a population of 525 Vocational Education students at the Surabaya Aviation Polytechnic. Data were collected through questionnaires and then analyzed using Multiple Linear Regression using SPSS 22 software. The results showed that Intrinsic Motivation Factors, Innovative Teaching Method Factors, and Industry Support Factors had a significant influence on students' creative thinking skills, while Learning Environment Factors did not have a significant effect. The Adjusted R Square determination coefficient of 0.687 indicates that 68.7% of the variation in creative thinking skills can be explained by the independent variables in the model, with the remaining 31.3% explained by other factors outside the model.

INTRODUCTION

Creative thinking is one of the essential competencies in vocational education, especially in dynamic fields such as aviation. This ability not only allows students to innovate and find new solutions to complex problems but also becomes the main capital in facing the challenges of an increasingly competitive world of work. Creativity in vocational education is essential because this field requires a flexible and solution-oriented approach to address real-world problems. Without the ability to think creatively, vocational graduates may not be prepared for the rapid changes in the industry they enter.

However, developing creative thinking skills among vocational students is not an easy task. The challenges include a curriculum that tends to be rigid, traditional teaching methods and a learning environment that does not support the exploration of new ideas. In addition, students often focus more on technical and operational aspects than on developing innovative ideas. These limitations can limit students' ability to think out of the box, which is an important skill in the profession they choose.

Several factors have been identified as key determinants in supporting vocational students' creative thinking abilities. Intrinsic motivation, for example, is a strong internal drive that can enhance creativity. Palyanti (2023)stated that when students are intrinsically motivated, they are more likely to engage deeply in the learning process and demonstrate higher creativity. In addition, innovative teaching methods involving technology, collaborative projects, and problem-based approaches can also stimulate students' creativity, as concluded by Neo & Neo (2001) dan Zhou et al. (2012).

The learning environment also plays an important role in supporting the development of creative thinking. However, as found in the research of Khan et al. (2018), not all learning environments can provide adequate support for the development of creativity. An environment that is too formal and structured can hinder students from exploring new ideas. On the other hand, industry support, through collaboration with educational institutions, can provide practical contexts and real challenges that motivate students to develop creative solutions (Khan, Brunner, & Gibson, 2018).

Based on the explanation above, this study aims to analyze the factors that influence the increase in creative thinking in vocational education, especially at the Surabaya Aviation Polytechnic. This study will focus on the influence of intrinsic motivation, innovative teaching methods, learning environment, and industry support on students' creative thinking skills. Thus, the results of this study are expected to provide deeper insights for vocational education institutions in developing more effective teaching methods and a more conducive environment. In addition, this study also aims to provide recommendations for the industry to be more active in collaborating with educational institutions in supporting the creativity of vocational students.

LITERATURE REVIEW

Creative Thinking

Creative thinking is an intellectual process in which a person deliberately assesses the quality of his or her thinking using reflective, independent, clear, and rational thinking (Oktariani & Ekadiansyah, 2020). It includes the skills of interpreting, assessing information, and using logical reasoning to analyze, compare, and evaluate arguments and make decisions. Critical thinking is useful in a variety of professions and activities such as reading, writing, and speaking because it can improve understanding of problems, choose appropriate solutions, and express ideas more effectively, especially in jobs that require creativity. According to Munandar (2009), creative thinking skills include four main aspects:

1. Fluent Thinking: The ability to generate many ideas, answers, or solutions quickly and in a variety of ways, with a focus on quantity rather than quality.
2. Flexible Thinking: The ability to produce varied ideas or answers and to see problems from multiple perspectives, with an emphasis on quality and usability.
3. Original Thinking: The ability to generate new, unique and unusual ideas, which reflect the individual's character and personality.
4. Elaboration Ability: The ability to enrich and develop ideas or concepts by adding details and making them more interesting and clear.

Intrinsic Motivation

Intrinsic motivation is the drive from within an individual to do an activity without any external coercion. This motivation is often related to personal interest, the desire to achieve, and the satisfaction obtained from completing a task. Interest in learning (1) is one important aspect of intrinsic motivation, which shows the extent to which an individual is interested in a particular learning material or activity. This interest usually arises from curiosity and satisfaction in gaining new knowledge (Yasin & Baresi, 2024). The desire to achieve (2) is another indicator that shows how someone is driven to achieve certain goals, such as high grades or recognition for their achievements. This desire often comes from the need to meet personal standards or achieve satisfaction in completing a challenge Abduloh et al. (2020). Satisfaction in completing a task (3) is a form of intrinsic motivation that arises when someone feels satisfied after completing a job or project. This provides a deep sense of achievement and motivates the individual to continue trying (Untari & Rani, 2021).

Innovative Teaching Methods

Innovative teaching methods are approaches that integrate the latest technology and learning strategies to improve the effectiveness of the teaching and learning process. The use of technology (1) as one of the important indicators includes the implementation of digital devices, applications, and online platforms to support more interactive and personalized learning (Khosyiin & Khoiiri, 2024). Project-based learning (2) is a method in which students work on real projects that are relevant to the curriculum, allowing them to develop critical

thinking, creativity, and problem-solving skills (Nastiti & Wathon, 2019). Collaborative approaches (3) refer to teaching methods that encourage cooperation between students in teams, increasing engagement and the development of social skills and the ability to work in groups (Wahyuningrum, 2022).

Supportive Learning Environment

A supportive learning environment is an important factor that influences the quality of the teaching and learning process. Adequate facilities (1) include comfortable classrooms, access to adequate educational resources, and technology that supports the learning process (Lestari et al., 2023). Support from the master (2) or teacher, including academic guidance and motivation given to students, is a crucial element that helps students reach their full potential (Scales, Van Boekel, Pekel, Syvertsen, & Roehlkepartain, 2020). Positive interactions between students (3) refer to healthy social relationships among students, which create a more collaborative and supportive learning atmosphere, thereby increasing the effectiveness of learning (Che Ahmad, Shaharim, & Abdullah, 2017).

Industry Support

Industry support is a key factor in increasing the relevance of education to the needs of the job market. Industry involvement in the curriculum (1) includes the participation of companies in designing and developing study programs that are in line with current industry needs (Enke et al., 2018). Internship programs (2) provide students with the opportunity to gain practical experience in the world of work, which is essential in preparing them for future careers (Karunaratne & Perera, 2019). Professional tutors (3) from the industry, who have direct experience in the field, can provide practical insights that are not only relevant but also inspiring for students (Doerner & Horst, 2022).

Hypothesis Development

1. Intrinsic Motivation for Creative Thinking

Intrinsic motivation, which includes interest in learning, desire to achieve, and satisfaction in completing tasks, has long been identified as a key driver of creativity. According to the Self-Determination Theory, intrinsic motivation enhances engagement in stimulating activities, encouraging individuals to explore different ways of solving problems and generating creative ideas (Bin Saeed, Afsar, Shahjehan, & Imad Shah, 2019). Therefore, this hypothesis states that the higher an individual's intrinsic motivation, the more likely they are to engage in creative thinking.

Several studies have supported the relationship between intrinsic motivation and creativity. Gong et al. (2017)found that intrinsically motivated individuals tend to be more creative in completing tasks compared to those who are extrinsically motivated. Darwanto (2019)also found that an environment that supports intrinsic motivation can improve a person's creative thinking ability. Based on the results of the study, the following hypotheses can be drawn.

H1. Intrinsic motivation has a positive and significant effect on creative thinking ability.

2. Innovative Teaching Methods for Creative Thinking

Innovative teaching methods, such as the use of technology, project-based learning, and collaborative approaches, are thought to stimulate creative thinking skills (Priyatni & As'ari, 2019). These methods provide a more dynamic learning experience, allowing students to actively participate in the learning process and face challenges that encourage them to think outside the box. This hypothesis states that the application of innovative teaching methods will improve students' creative thinking skills.

Research by Ramadhan & Hindun (2023)shows that project-based learning can enhance students' creativity by providing opportunities to apply knowledge in real contexts. Studies by Tsai et al. (2020)also show that collaborative approaches encourage students to think creatively through social interactions that encourage the exchange of ideas between students. Based on the results of the study, the following hypotheses can be drawn.

H2. Innovative Teaching Methods have a positive and significant effect on creative thinking skills.

3. Learning Environment for Creative Thinking

The learning environment, including adequate facilities, teacher support, and positive interactions between students, is believed to create an atmosphere conducive to the development of creativity. A supportive environment not only provides the necessary resources but also creates a safe psychological climate for students to experiment with new ideas (Richardson & Mishra, 2018). This hypothesis states that a supportive learning environment will contribute positively to students' creative thinking abilities.

Research by Richardson & Mishra (2018) shows that a positive classroom environment is significantly related to student creativity. Another study by Hayati et al. (2023)revealed that teacher support can encourage students to develop creative ideas. Based on the results of the study, the following hypotheses can be drawn.

H3. The learning environment has a positive and significant influence on creative thinking skills.

5. Industry Support for Creative Thinking

Industry support, which includes industry involvement in the curriculum, internship programs, and the involvement of professional tutors, is expected to provide practical insights and up-to-date knowledge that stimulate students' creativity. This support not only provides direct experience in the field but also opens up opportunities for students to connect theory with practice, which is key in developing creative solutions to real problems. This hypothesis states that industry support will enhance students' creative thinking skills.

Studies by Setiawan & Komara (2020)show that industry involvement in education can increase the relevance of learning and encourage creativity through practical applications. Arta et al. (2023)found that internship programs

allow students to face real challenges that encourage them to develop creative solutions. In addition, Zamberlan & Wilson (2017) found that professional tutors from the industry can provide insights that enrich students' understanding and encourage their creativity. Based on the results of the study, the following hypotheses can be drawn.

H4. Industrial support has a positive and significant effect on creative thinking skills.

Based on the development of the hypothesis above, the current research framework is as follows.

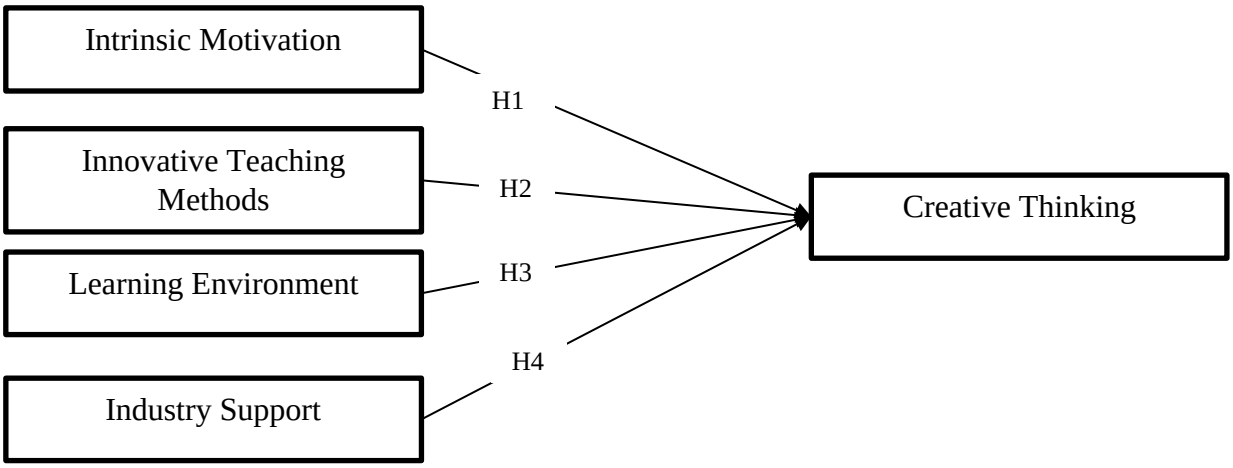

Figure 1. Research Framework

METHODOLOGY

Types of research

This type of research was conducted by the author to see the high and low relationship or influence between variables and to find or obtain information about the current real situation with a Quantitative approach. Through this research, the author can ascertain how much is caused by a variable with the relationship or influence between those caused by other variables, by using this type of research it is expected to be able to explore the factors that influence critical thinking skills of students of Aviation Vocational Education, Surabaya Aviation Polytechnic in the 2023/2024 Academic Year.

Data Collection Instruments / Tools

In this study, the tools used were questionnaires and interviews. The questionnaire was used as a data collection tool in the form of questions filled in by respondents. Its function is to obtain information relevant to the research objectives and ensure that the information has validity and reliability. The purpose of creating a research instrument is to facilitate the search for variable data to be measured for accuracy, namely Intrinsic Motivation, Innovative Teaching Methods, Learning Environment, Industry Support (independent variables) and Creative Thinking (dependent variable).

The questionnaire technique is a method of collecting data using a list of questions that have been compiled and then distributed to respondents (samples). Fitri et al. (2019) states that a questionnaire is many written questions

used to obtain information from respondents regarding reports about themselves or things that are known. The questionnaire used is a closed questionnaire, where the list of questions is compiled by providing alternative answers so that respondents only need to choose one of many choices.

Population and Sample

Population is the entire research subject. While the sample or example is a part or representative of the population being studied. This sampling must be carried out in such a way that a sample is obtained that can truly function or describe the actual state of the population. In other words, the sample must be representative. The population of this study was all active students in the Aviation Vocational Education of the Surabaya Aviation Polytechnic in the 2023/2024 Academic Year, totalling 525 people. According to Saiful (2020), the determination of the number of samples uses the Slovin formula, which is as follows.

$$n = \frac{N}{1 + N \times e^2}$$

$$n = \frac{525}{1 + 525 \times 0.10^2}$$

$$n = 84$$

Information :

N : Population (525)

n : Number of samples

e : Percentage of tolerable errors (10%)

In accordance with the basic principle Arikunto (2019), a sample of 50% can be used if the population is less than 100, while a sample of 10-15% can be used if the population is more than 100. According to the research Amin et al. (2023), the sample size for this study was determined using the Slovin method, with an error rate of 10%.

A total of 84 samples were obtained as respondents of active students in the Aviation Vocational Education of the Surabaya Aviation Polytechnic in the 2023/2024 Academic Year. However, the author increased the number of respondents to 100 to ensure that the collected questionnaire data was valid and reliable using a simple random sampling technique.

Operational Variables

The definition of each independent variable (Intrinsic Motivation, Innovative Teaching Methods, Learning Environment, and Industry Support) and dependent variable (Creative Thinking) in this study are described in the following table.

Table 1. Operational Data Variables

Variable Name		Operational Definition	Indicator
Dependent	Creative Thinking	A person's ability to generate new and innovative ideas through a smooth, flexible, original thinking process, and the ability to elaborate ideas in detail.	1) Fluent Thinking 2) Flexible Thinking 3) Original Thinking 4) Elaboration Ability
Independent	Intrinsic Motivation	Internal drive that drives a person to learn and achieve goals without external pressure, is based on personal interest, desire to achieve, and satisfaction in completing tasks.	1) Interest in Learning 2) Desire to Achieve 3) Satisfaction in Completing Tasks
	Innovative Teaching Methods	A teaching approach that uses the latest technology and strategies to make the learning process more effective and engaging, and encourages active student involvement.	1) Use of Technology 2) Project Based Learning 3) Collaborative Approach
	Learning Environment	Factors in the learning environment that create a conducive atmosphere for the teaching and learning process, include facilities, support from teachers, and positive interactions between students.	1) Adequate Facilities 2) Support from Teachers 3) Positive Interaction Between Students
	Industry Support	Forms of industry participation and involvement in education that provide practical experience and relevant knowledge to prepare students for the world of work.	1) Industry Involvement in Curriculum 2) Internship Program 3) Professional Tutor

Data Analysis Techniques

This study uses a qualitative descriptive approach that aims to identify the influence of Intrinsic Motivation, Innovative Teaching Methods, Supportive Learning Environment, and Industry Support on the Creative Thinking of Aviation Vocational Education students of Surabaya Aviation Polytechnic. Therefore, researchers use data analysis techniques such as multiple linear regression or Ordinary Least Square (OLS) equations together with SPSS 22 software, by the stated objectives. The OLS estimation equation is presented below.

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \varepsilon$$

Information :

Y : Creative Thinking

$\beta_{1,2,3,4}$: Independent Variable Coefficient ($X_{1,2,3,4}$)

β_0 : Constant

X_1 : Intrinsic Motivation

X_2 : Innovative Teaching Methods

X_3 : Learning Environment

X_4 : Industry Support
ε : Error or Error

RESULTS AND DISCUSSION

Results

Validity testing is one of the important steps in the process of developing or using measurement instruments such as questionnaires or tests. The goal is to determine how well the instrument measures the target construct. Generally, researchers will use Pearson correlation as a validity test (Sürücü & Maslakci, 2020). After the Pearson correlation coefficient is calculated, the results must be assessed for their suitability in showing the reliability of the instrument. If you want to know how significant the correlation results are, you can use the Pearson correlation distribution table, sometimes called the "r table", or perform a statistical test. The r table refers to a table that contains critical threshold values for the Pearson correlation coefficient at a certain level of significance, usually measured at a significance level of 0.05. The results of the validity test are presented in the table below.

Table 2. Validity and Reliability Test

Variables	Item	r count	r table (N-2)	Cronbach's Alpha	Information
Creative Thinking	BP1	0.839	0.1966	0.83	Valid and Reliable
	BP2	0.787			Valid and Reliable
	BP3	0.768			Valid and Reliable
	BP4	0.886			Valid and Reliable
Intrinsic Motivation	MI1	0.888		0.886	Valid and Reliable
	MI2	0.936			Valid and Reliable
	MI3	0.892			Valid and Reliable
Innovative Teaching Methods	MPI1	0.839		0.808	Valid and Reliable
	MPI2	0.855			Valid and Reliable
	MPI3	0.86			Valid and Reliable
Learning Environment	LB1	0.853		0.705	Valid and Reliable
	LB2	0.794			Valid and Reliable
	LB3	0.727			Valid and Reliable
Industry Support	DI1	0.663		0.76	Valid and Reliable
	DI2	0.779			Valid and Reliable
	DI3	0.683			Valid and Reliable

The Pearson correlation result (r-count) is compared with the r-table value with degrees of freedom 100-2 = 98 of 0.1966 to determine significance. Since the r-count is greater than the r-table, all research questions are considered valid. Reliability testing is carried out after the validity test, it is important to test the reliability of the questionnaire and test before being used in research. Consistent measurement of the same concept indicates reliability, which is assessed by Cronbach's alpha. Cronbach's alpha value> 0.7 indicates good reliability, and all variables in this study (Intrinsic Motivation, Innovative Teaching Methods,

Supportive Learning Environment, Industry Support, and Creative Thinking) are declared reliable.

Classical Assumptions

1. Normality Test

One of the most basic tests in regression analysis is the normality test. For this to be maintained, the residuals or errors produced by the regression model must follow a normal distribution. The Kolmogorov-Smirnov test is one way to check for normality.

Table 3. Kolmogorov Smirnov Normality Test

One-Sample Kolmogorov-Smirnov Test		
		Unstandardized Residual
N		100
Normal Parameters [a,b]	Mean	.0000000
	Std. Deviation	1.75139793
Most Extreme Differences	Absolute	.077
	Positive	.077
	Negative	-.077
Test Statistics		.077
Asymp. Sig. (2-tailed)		.149 [c]

Researchers can conclude that the residuals are normally distributed because the p-value (Asymp. Sig 2-tailed) of 0.2 from the normality test is greater than the established significance level (0.05) in Table 3.

2. Multicollinearity Test

In regression analysis, the multicollinearity test is a statistical test used to determine whether or not there is a multicollinearity problem. When two or more independent variables in a regression model are significantly related to each other, a phenomenon called multicollinearity arises. Therefore, the independent variables of the study need to be free from multicollinearity.

Table 4. Tolerance and VIF Values

Variables	Tolerance	VIF
Intrinsic Motivation	0.397	2,518
Innovative Teaching Methods	0.374	2,676
Learning Environment	0.498	2.010
Industry Support	0.641	1,561

The tolerance value of the independent variables Intrinsic Motivation, Innovative Teaching Methods, Supportive Learning Environment, and Industry Support is more than 0.1. In addition, the VIF value with independent variables

<10. This means that the number of independent variables does not experience multicollinearity in the regression model. So that the classical assumption of being free from multicollinearity is met.

3. Heteroscedasticity Test

In regression analysis, the heteroscedasticity test is a statistical test used to determine whether a regression model has a heteroscedasticity problem. If the residual variance or error variance in a regression model varies along the value of the independent variable, then the model is said to be heteroscedastic. One way to test for heteroscedasticity is by looking at the scatterplot pattern. The scatterplot produced from the factors that influence creative thinking is as follows.

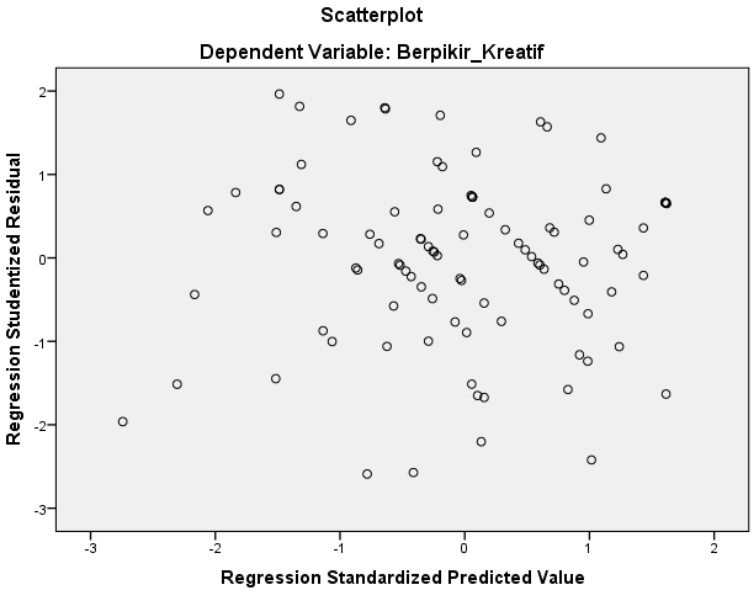

Figure 2. Scatterplot of Heteroscedasticity

Figure 2 shows that the data points are spread out and do not form a pattern. Thus, there is no heteroscedasticity problem so the classical assumptions of this regression model can be met.

Multiple Linear Regression

When performing statistical analysis with SPSS, the simultaneous test (F test) is used to compare multiple independent variables against one dependent variable in a regression model. (Alita et al., 2021). If you want to know whether there is an independent variable that has a significant effect on the dependent variable, this test can help. Table 6 below shows the results of simultaneous testing (F Test).

Table 5. F Test

ANOVA [a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	707,168	4	176,792	55,307	.000 [b]
	Residual	303,672	95	3.197		
	Total	1010.840	99			

a. Dependent Variable: Creative_Thinking

b. Predictors: (Constant), Industry_Support, Learning_Environment, Intrinsic_Motivation, Innovative_Teaching_Methods

Interpretation of simultaneous tests is based on the comparison of variability between groups and within groups. If the sig.= 0.00 <α = 0.05, then the independent variables simultaneously affect the dependent variable and are accepted, and according to the sig. value in table 7 the researcher can conclude that at least two groups have significant differences in the context of the analysis carried out. After the researcher completes the simultaneous test using the F test, the researcher proceeds to the partial test, also known as the t-test. In multiple linear regression, the t-test is used to determine the relative importance of each independent variable to the dependent variable, while the other variables are considered constant (Alita et al., 2021). By using the t-test, researchers can determine whether a particular independent variable has a significant effect on the dependent variable. The results of the t-test are presented in the table.

Table 7. T-test

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	-1,843	1,290		-1.428	.156
	Intrinsic_Motivation	.642	.120	.479	5.367	.000
	Innovative_Teaching_Methods	.280	.123	.210	2.278	.025
	Learning_Environment	-.014	.126	-.009	-.111	.912
	Industry_Support	.471	.118	.281	4.002	.000
a. Dependent Variable: Creative_Thinking						

Interpretation of the t-test results involves looking at the t-value and the related sig. or p-value. Based on Table 5, it is known that the t-value for each independent variable in the variables Intrinsic Motivation, Innovative Teaching Methods, Learning Environment, and Industry Support are respectively 5.367; 2.278; -.111; and 4.002. Almost all independent variables (Intrinsic Motivation, Innovative Teaching Methods, and Industry Support) are greater than the high t-table of 1.98397 and the p-value (sig.) for the three independent variables is smaller than the significance level α (0.05). Thus, the independent variables Intrinsic Motivation, Innovative Teaching Methods, and Industry Support indicate that the proposed hypotheses (H1, H2, H4) are accepted. Meanwhile, the

independent variable of the Learning Environment shows a t-count value (-0.111) < t-table (1.98397) and a p-value (sig.) of 0.912> α (0.05). This shows that the hypothesis proposed regarding the influence of the learning environment on Creative Thinking (H3) is rejected.

Coefficient of Determination

The coefficient of determination, also known as R-squared (R2), is a statistical metric used in regression analysis to assess the explanatory power of a regression model for changes in the dependent variable. In addition, Adjusted R-Square is also used for the same purpose for more than one independent variable. Simply put, the higher the Adjusted R-squared value, the better the fit of the regression model to the data. The higher the Adjusted R-squared number, the better the regression model is in accounting for outliers in the data. Table 6 presents the results of the determination coefficient study.

Table 6. Coefficient of Determination

Model Summary [b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.836 [a]	.700	.687	1.78789

a. Predictors: (Constant), Industry_Support, Learning_Environment, Intrinsic_Motivation, Innovative_Teaching_Methods
b. Dependent Variable: Creative_Thinking

The Adjusted R Square determination coefficient of 0.687 indicates that 68.7% of the variation in creative thinking ability of Aviation Vocational Education students at the Surabaya Aviation Polytechnic can be explained by the factors of Intrinsic Motivation, Innovative Teaching Methods, Learning Environment, and Industry Support. In other words, this model has a strong ability to explain the relationship between the independent variables (Intrinsic Motivation, Innovative Teaching Methods, Learning Environment, and Industry Support) with the dependent variable (creative thinking ability). The remaining 31.3% of the variation is likely caused by other factors not included in this model. Adjusted R Square is used to avoid overestimation that often occurs in ordinary R Square, so this result provides a more accurate picture of the predictive power of the model.

DISCUSSION

The results of this study indicate that Intrinsic Motivation has a positive and significant influence on the Creative Thinking of Aviation Vocational Education students at the Surabaya Aviation Polytechnic, as hypothesis H1 is accepted. Intrinsic motivation is a drive that comes from within an individual to do something because they feel interested and satisfied with what they do. As expressed by Nurishlah et al. (2023) emphasise that intrinsically motivated individuals tend to have higher levels of creativity because they are more involved in the learning process and have a desire to explore and discover new

things. Support for these results is also found in research Conradty & Bogner (2020)showing that intrinsic motivation is very important in improving creative thinking skills, especially in the context of vocational education that demands creative solutions in applying theory to practice.

Furthermore, Innovative Teaching Methods are also proven to have a positive and significant influence on students' Creative Thinking, which supports hypothesis H5. Innovative teaching involving the use of technology, collaborative methods, and project-based approaches is proven to be able to stimulate students' critical and creative thinking. This is in line with Hernández-de-Menéndez et al. (2019)the statement that active learning through social interaction and the use of technology can facilitate the process of constructing knowledge more creatively. Research by Kwangmuang et al. (2021)also supports this finding, where innovative teaching methods are considered one of the main factors in facilitating the development of creative thinking, especially in educational contexts that require high problem-solving skills such as aviation vocational education.

However, this study also found that the Learning Environment did not have a positive and significant effect on students' Creative Thinking, so the H3 hypothesis was rejected. These results indicate that although the learning environment is important, it is not always a determining factor in encouraging student creativity. It is possible that the existing learning environment does not fully support activities that can stimulate creative thinking, such as adequate facilities or an academic atmosphere that encourages the exploration of new ideas. Several previous studies such as those conducted by Elsbach & Stigliani (2019)revealed that a learning environment that only focuses on formality and order may not provide enough space for students to develop their creativity. Therefore, these results indicate the need for further evaluation of the elements of the learning environment that truly contribute to the development of creativity.

On the other hand, Industry Support has been shown to have a positive and significant effect on students' Creative Thinking, supporting the H4 hypothesis. This shows that collaboration between vocational education institutions and the aviation industry is very important in developing students' creativity. The question support can be in the form of providing internship opportunities, collaborative projects, and training that is relevant to industry needs. Sanabria & Arámburo-Lizárrag (2017)emphasized that collaboration with industry can provide students with access to practical knowledge and real challenges that encourage them to think creatively. This study is in line with the results of research conducted by Eberhard et al. (2017)which showed that support from industry can significantly increase students' creative capacity in facing challenges in the world of work.

CONCLUSION

The results of this study indicate that Intrinsic Motivation, Innovative Teaching Methods, and Industry Support have a positive and significant influence on the creative thinking ability of Aviation Vocational Education students at the Surabaya Aviation Polytechnic. These factors can explain 68.7%

of the variation in students' creative thinking ability, which confirms the importance of a holistic approach in developing vocational education. In contrast, the Learning Environment was not proven to have a significant effect, indicating that this factor requires further evaluation to understand its role in a more specific context.

The implications of these findings emphasize the importance of educational institutions focusing more on developing intrinsic motivation and implementing innovative teaching methods as part of their vocational education strategy. Institutions also need to strengthen collaboration with industry to provide students with relevant practical experiences and stimulate creativity. On the other hand, the results showing the insignificant influence of the Learning Environment on creativity require a more in-depth study of the elements of the learning environment that can support the development of creative thinking.

The recommendations that can be given are that vocational education institutions need to develop programs that can increase students' intrinsic motivation, such as interest-based learning and projects. In addition, there needs to be an increase in innovation in teaching methods by integrating technology and collaborative approaches. For the Learning Environment, it is recommended to conduct a comprehensive assessment to create an environment that is more supportive of exploration and creativity. Finally, strengthening partnerships with industry should be a priority to provide students with access to real experiences that enrich creative thinking skills.

ADVANCED RESEARCH

In writing this article the researcher realizes that there are still many shortcomings in terms of language, writing, and form of presentation considering the limited knowledge and abilities of the researchers themselves. Therefore, for the perfection of the article, the researcher expects constructive criticism and suggestions from various parties.

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