# The Effect Of The Boarding School System On The Critical Thinking Skills Of Cadets In The Diploma 3 Air Traffic Control At The Surabaya Aviation Polytechnic

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**ABSTRACT**
This study aims to determine the effect of the boarding school system on the critical thinking skills of cadets in the Diploma 3 Air Traffic Control at the Surabaya Aviation Polytechnic and the factors that influence their critical thinking. This research employed a quantitative method with a questionnaire based on a Likert scale as the data collection tool. The research sample included the entire population of Diploma 3 Air Traffic Control cadets (n=30). Data analysis was performed using SPSS version 29 with a t-test. The results indicated a significance value of 0.000 < 0.05, which means that the boarding school system has a significant effect on cadets' critical thinking skills. The main influencing factors are environmental discipline, dormitory social life, intensity of teacher and supervisor guidance, additional extracurricular and academic activitie, and educational facilities. The boarding school system has proven effective in developing analytical, evaluative, reflective, and independent thinking patterns.

***Keywords:*** *" Boarding School, Critical Thinking, Cadets, Air Traffic Control "*

## 1. INTRODUCTION

Surabaya Aviation Polytechnic, under the Ministry of Transportation of the Republic of Indonesia, implements a boarding school-based education system with semi-military guidance for all cadets, including the Diploma 3 Air Traffic Control Study Program that prepares prospective professional Air Traffic Controllers (ATC). This system creates a disciplined, structured, and intensive learning environment, but shows a striking difference in critical thinking skills between first-year cadets who are still adapting and third-year cadets who have been studying for approximately three years. This difference indicates a significant influence of boarding school on the development of critical thinking skills, although empirical studies in the context of aviation education are still limited. Critical thinking is the ability to think rationally, reflectively, and systematically in analyzing information, evaluating arguments, and making decisions based on evidence. This ability is important in education because it encourages students to be independent in critical thinking, solving problems, and making the right decisions. The relationship between boarding school and critical thinking is built through a learning environment that demands discipline, active involvement, and intense social interaction. In the context of aviation education, such as at the Surabaya Aviation Polytechnic, the boarding school system is combined with semi-military coaching and technical training. This combination forms the character of discipline, leadership, and responsibility, while also demanding high critical thinking skills in making quick and accurate decisions, as is the demand of the Air Traffic Controller profession.

Boarding schools are educational institutions that provide dormitories for students to live in during their studies, in addition to classroom learning. The structured environment in boarding schools aims to support intensive academic learning, character development, and the improvement of social skills. According to (Chang et al., 2023), boarding schools provide students with the opportunity to utilize their study time more optimally with the support of existing facilities. However, this system also brings challenges, such as stress that can arise from separation from family and adaptation to a different social environment. On the other hand, (Johnson & Johnson, 1999) stated that a collaborative educational environment that supports social skills is crucial for managing education in boarding schools.

Critical thinking is the ability to think rationally, objectively, and reflectively in making decisions or determining what to believe, after considering various arguments and evidence. (Paul & Elder, 2014) explain that critical thinking is a structured and systematic thought process, which requires individuals to evaluate information objectively and avoid bias. (Ennis, 2011) states that critical thinking involves the rational assessment of claims or arguments using analysis, synthesis, and evaluation skills. (Facione & Gittens, 2015) identifies several key components of critical thinking, such as interpretation, analysis, evaluation, inference, and deductive and inductive reasoning, which enable individuals to understand, critique, and draw conclusions based on existing evidence. Critical thinking is very important in education, because it encourages students to evaluate information in depth and develop independent thinking. However, in practice, critical thinking can be hampered by various factors, such as cognitive biases, social influences, and emotions. Therefore, critical thinking skills are not only useful in academic contexts, but also in everyday life to help individuals make more informed decisions and solve problems effectively.

### *1.1. Definition Of Boarding School*

Boarding schools are educational institutions that provide students with a residence, where religious and general education are provided in an integrated manner, with the support of caregivers to foster students' moral and intellectual development (Zakiyah, 2022). This system integrates students, teachers, and school administrators in a single dormitory environment for a specific period, enabling the implementation of an efficient educational model that emphasizes moral values, skill development, and character building (Tnunay, 2022). Students are required to live in the dormitory together and study during the learning process. Administrators, students, and teachers live on the school grounds, allowing for intensive supervision of student development and character.

### *1.2.* Advantages of Boarding School

Boarding schools offer many advantages, such as effective educational management, intensive student supervision, and strengthening religious character. By combining general and religious subjects, the boarding school curriculum supports the achievement of national education goals and improves educational quality (Alwi, 2023). The advantages of boarding schools include instruction that combines religious and general knowledge, as well as direct role models from educators. This system also optimizes students' cognitive, affective, and psychomotor abilities, building strong personalities (Bafadhol, 2016).

Boarding schools teach students the values of independence, foster strong social relationships, and empower the community (Purwoko, 2022). Other advantages include improved student academic achievement and the availability of high-quality educational and teaching facilities, all of which contribute to the achievement of goals and student achievement (Ulfiandi, 2022).

### *1.3. Disadvantages of Boarding Schools*

Boarding schools face various challenges that can impact students' educational experiences. While they foster character and moral values, there are several issues that warrant attention. Students living in boarding schools are more susceptible to mental health issues such as depression and PTSD, especially during crises like the COVID-19 pandemic (Nurina & Hermataisyah, 2023). Other drawbacks include a lack of integration between religious studies and general knowledge, challenges in dealing with technological developments, and the potential loss of local spiritual and cultural values in the era of information and communication technology (Musyarif, 2023).

These challenges can impact students' overall experiences and development. Several factors, such as negative peer interactions that can lead to bullying, suboptimal communication between parents and schools, and limited resources, also impact the quality of student life and education in boarding schools (Sholihah et al., 2019).

### *1.4. Definition Of Critical Thinking*

Critical thinking is an organized and responsible intellectual activity, based on logical and reflective thought, that enables individuals to make informed decisions. This concept is closely related to philosophy, particularly analytical philosophy, which emphasizes the importance of effective communication (Chakraborty, 2017). Critical thinking skills involve the in-depth evaluation of knowledge claims, not simply focusing on the validity of a particular opinion or result.

### *1.5. Characteristics of Critical Thinking*

To become proficient critical thinkers, students must possess four essential traits of critical thinking: metacognitive reflection, an understanding of sociocultural power structures, a pursuit of the common good, and the application of critical thinking and higher-order logical reasoning (Bermingham, 2015). Distinctive traits of critical thinking include truth-seeking, open-mindedness, analyticalness, systematicity, confidence in critical thinking, curiosity, and cognitive maturity, as identified in research on dispositions toward critical

thinking among college students (Rochmad & Kharis, 2018).

In complex and uncertain situations, traits of critical thinking such as open-mindedness, flexibility, skepticism, independence, persistence, empathy, assertiveness, courage, and humility help people systematically evaluate information, identify biases, and draw reasoned conclusions (Badii Zabeh et al., 2005).

*1.6 Objectives of Critical Thinking Skills*

The goals of critical thinking include analyzing, evaluating, and synthesizing information to make informed decisions and solve problems effectively. Critical thinking not only helps understand complex issues but also promotes public health awareness and informed citizenship (Nikmah et al., 2017). Beyond education, critical thinking is essential for making sound decisions in everyday life and professional settings. It fosters a culture of skepticism and impartiality, is essential for navigating misinformation, and is crucial for making informed judgments (Latif et al., 2019).

Critical thinking enhances problem-solving skills, enabling individuals to approach challenges from multiple perspectives. It involves the systematic evaluation of information, which is particularly important in fields such as mathematics and science (Saleh et al., 2022).

*1.7 Critical Thinking Indicators*

Critical thinking indicators are important metrics that assess the ability to effectively analyze, evaluate, and synthesize information. Various studies have identified specific indicators that can be used across various educational contexts, particularly in science and mathematics education. These indicators serve as benchmarks for evaluating students' critical thinking skills and guiding instructional strategies (Febri, 2019).

The critical thinking indicators analyzed include focusing questions, analyzing arguments, asking and answering questions, evaluating the reliability of sources, observing, making deductions and inductions, reasoning about decisions, defining terms, identifying assumptions, and interacting with others (Utami et al., 2021). Critical thinking indicators include traits such as curiosity, fair-mindedness, flexibility, diligence, and a focus on inquiry. Facione's taxonomy identifies six key skills: interpretation, analysis, evaluation, inference, explanation, and self-regulation, each containing various sub-skills essential for critical thinking (Alsaleh, 2020).

*1.8 Diploma 3 In Air Traffic Control*

The Diploma 3 Air Traffic Control Study Program at the Surabaya Aviation Polytechnic is a vocational education program focused on providing air traffic services in accordance with national and international standards. Based on BAN-PT Decree No. 5965/SK/BAN-PT/SK-PPJ/DipI-III/VI/2021, the Air Traffic Study Program at the Surabaya Aviation Polytechnic received "Very Good" accreditation, valid from February 5, 2021, to February 5, 2026.

During the three-year program, cadets receive a gradual learning process, starting from fundamental courses to specialized competencies in the field of air traffic. In the first semester, the material covered includes general basic courses such as English, Basic Mathematics, Aviation Knowledge, and Religious Education. In subsequent semesters, learning begins to focus on technical competencies, such as Aerodrome Control Procedures, Aviation Regulations based on ICAO Annexes, and air traffic control practices using simulators.

One of the superior facilities used in the learning process is a 360-degree aerodrome simulator designed to mimic real-life operational conditions in a control tower. This simulator allows cadets to practice their skills in managing aircraft movements in airport areas, complete with displays of meteorological data such as wind speed and direction, as well as visual information that closely approximates realistic conditions.

In addition to on-campus practice, cadets are also required to participate in two On-the-Job Training (OJT) sessions. This OJT phase includes training in the Aerodrome Control and Approach Control Procedural units, which do not utilize visual surveillance. During OJT, cadets gain hands-on experience performing air traffic control functions under the guidance and supervision of licensed personnel in designated operational units, such as SAMS Sepinggan International Airport in Balikpapan and various other units managed by AirNav Indonesia.

The career prospects for graduates of the Diploma 3 Air Traffic Control Program are very promising, including positions as Air Traffic Controllers (ATC) under AirNav Indonesia, a provider of air navigation services in Indonesia. Graduates also have opportunities to work in the private sector, such as the oil and gas industry, or with international institutions. Some alumni have even successfully worked as air traffic controllers abroad.

With an integrated educational system that combines theory, practice, and field training, the Diploma 3 Air Traffic Control Program at the Surabaya Aviation Polytechnic is committed to producing professional, competent graduates who are ready to face the challenges of the workplace, both nationally and internationally.

*1.9 Surabaya Aviation Polytechnic*

Poltekbang Surabaya (Surabaya Aviation Polytechnic) is a vocational higher education institution under the Ministry of Transportation that provides aviation education and training programs. The

institution's primary goal is to produce professional graduates with integrity and high competency to support the safety and efficiency of national and international aviation operations.

One of its flagship programs is the Diploma 3 Air Traffic Control (ATC) Program, designed to equip cadets with the skills to become air traffic controllers. The program's curriculum is designed in accordance with the standards set by the International Civil Aviation Organization (ICAO), encompassing both technical and non-technical skills.

Currently, there are 31 active cadets in the ATC study program, consisting of 18 third-year cadets (Class XIII) and 13 first-year cadets (Class XIV). During their studies, all cadets are required to live on campus, under a boarding school system equipped with semi-military training.

One form of this development is the "Taruna Jaga" system, which assigns cadets on a rotating basis to oversee all activities 24/7. This task includes overseeing order, reporting on cadet strength, and ensuring that all daily schedules are running according to regulations.

The daily routine begins at 4:00 a.m. Western Indonesian Time (WIB) with "Duty On," which includes waking up, praying, and conducting a survey. The activity continues with morning exercise, breakfast, and morning roll call. Afterward, cadets participate in classroom lectures and practical sessions according to their study program. The afternoon begins with roll call and lunch, followed by a second lecture session, which focuses more on field practices such as aviation communications and radar simulator operation. The afternoon and evening activities are filled with worship, free exercise, dinner, evening study time, roll call, and a break at 10:00 p.m. after the "Duty Off" period.

The boarding school system at Poltekbang Surabaya implements a semi-military training model that emphasizes discipline, leadership, and responsibility. Cadets are required to live in campus dormitories during their education period and all their activities are regulated in a strict system and supervised by instructors and supervisory elements from the Indonesian Air Force.

## 2. METHODS

This study employed a quantitative approach with a survey research design. This method was chosen to objectively measure the effect of the boarding school system on the critical thinking skills of cadets in the Diploma 3 Air Traffic Control at the Surabaya Aviation Polytechnic. This study was designed to collect primary data through a questionnaire compiled based on the research variable indicators. Analysis was conducted using inferential statistical tests to test the hypotheses and determine the level of influence of the independent variables on the dependent variable.

### *2.1. Type of Research*

This research uses quantitative methods. Quantitative methods are research methods based on the philosophy of positivism. They are used to study specific populations/samples using research instruments. Quantitative/statistical data analysis is used to test hypotheses (Sugiyono, 2023).

Quantitative research is called scientific discovery because it adheres to scientific principles: concrete, empirical, objective, measurable, rational, and systematic. This research uses general concepts to understand and explain specific phenomena (Hamzah & Susanti, 2020).

### *2.2. Research Design*

Research design is a strategy or system used by researchers to organize and oversee their research process. To achieve research objectives effectively and efficiently, research design helps researchers systematically collect, analyze, and interpret information (Narbuko & Achmadi, 2010).

### *2.3. Research Variables*

An independent variable, also known as a predictor, input, treatment, stimulus, cause, and so on, is a variable manipulated to observe its effect or influence on the dependent variable (Hamzah & Susanti, 2020). The independent variable (X) in this study is the boarding school system.

The dependent variable is also called the output, criterion, or consequence variable. In Indonesian, it's called the bound variable. A bound variable is a variable influenced by or resulting from the independent variable (Sugiyono, 2019). The dependent variable (Y) in this study is the critical thinking of Diploma 3 Air Traffic Cadets at the Surabaya Aviation Polytechnic.

### *2.4. Population and research sample*

This study involved a population consisting of all 30 Air Traffic Control Diploma 3 cadets at the Surabaya Aviation Polytechnic.

Because the population size in this study was below the threshold of 100 individuals, this study used a total sample, which included every member of the population: 17 Air Traffic Control Cadets from Class XIII and 13 Air Traffic Control Cadets from Class XIV..

### *2.5. Data collection technique*

Data collection techniques are the methods/procedures that researchers use to collect relevant data/information for research purposes. These techniques are crucial to ensuring that the collected data is valid, credible, and can be used to answer questions or test research hypotheses (Arikunto, 2010). The author took steps to collect data using a questionnaire that was created from the indicators of the problems found.

### *2.6. Data Analysis Techniques*

Data analysis techniques are the methods/processes used to process and interpret collected data to answer research questions, test hypotheses, or draw conclusions. This process involves compiling, processing, and interpreting data, both quantitatively (using statistics) and qualitatively (using meanings for non-numerical data) (Miles et al., 2014).

The data analysis in this study utilized statistical data from all sample respondents' responses. For data analysis, the researcher used SPSS version 29 software. The researcher used a Likert scale as a benchmark for variables. The Likert scale is used to measure the attitudes, opinions, and perceptions of an individual or group of people regarding social phenomena (Sugiyono, 2023).

Data will be analyzed using SPSS version 29, with the following steps:

a. Validity Test: The validity of the instruments in this study was tested using IBM SPSS Statistics 29 software by conducting a bivariate correlation test using the product-moment correlation method. The validity test technique using the product-moment correlation method involves correlating the scores of each item with the total score, which is the sum of the scores for each item.
b. Reliability Test: The instrument's reliability was tested using IBM SPSS Statistics 29 software using scale-reliability analysis and the Cronbach alpha method. The Cronbach alpha criteria are as follows: less than 0.6 is considered poor, 0.6-0.79 is acceptable, and 0.8-1 is good (high consistency).
c. Normality Test: The normality test in this study was assisted by IBM SPSS Statistics 29 with One-Sample Kolmogorov-Smirnov. Criteria: sig < 0.05 for non-normal data, sig > 0.05 for normal data.
d. Linearity Test: The linearity test determines whether the relationship between two variables is linear. This is a prerequisite for linear regression analysis. IBM SPSS Statistics 29 uses the Test for Linearity at a significance level of 0.05.
e. Hypothesis Testing: Hypothesis testing was conducted using simple linear regression analysis. This method is applied to predict or test the effect of independent variables on dependent variables. All calculations were performed using SPSS statistical software. Decisions in simple linear regression tests are based on sig. A sig ≤ 0.05 indicates an effect between the independent and dependent variables. A sig > 0.05 indicates no effect.
f. Descriptive Statistics : According to (Sugiyono, 2023), descriptive statistics is a statistical technique used to analyze data by describing or depicting the data that has been collected as it is without intending to draw generally applicable conclusions (generalizations).

### *2.7. Place and Time of Research*

This research took place at the Surabaya Aviation Polytechnic, Jl. Jemur Andayani I No. 73, Surabaya, for observation and data collection relevant to the research methodology.

In conducting this research, the author conducted observations and data collection over the past four months, from January to April 2025.

## 3. RESULTS AND DISSCUSION

### **3.1** Results

The results of this study present the findings obtained based on the analysis of the data collected in accordance with the research objectives. The analyzed data were collected from questionnaires, which were then processed to answer the research questions. This section presents a description of the results, presented in tables, graphs, and narrative form, to provide a clear picture of the phenomenon being studied.

#### ***3.1.1** The effect of the boarding school system on the critical thinking skills of cadets in the Diploma 3 Air Traffic Control at the Surabaya Aviation Polytechnic*

**Table 1.** Normality Test Results

| Test Type | Value | Df | Asymptotic Significance (2-sided) |
|---|---|---|---|
| Pearson Chi-Square | 14.483 | 1 | <,001 |
| Continuity Correction[b] | 3.122 | 1 | .077 |
| Likelihood Ratio | 5.996 | 1 | .014 |
| Fisher's Exact Test (2-sided) | - | - | .067 |
| Linear-by-Linear Association | 14.000 | 1 | <,001 |

Based on table 1, the results of the Chi-Square test show that there is a significant relationship between the Boarding School System and the Critical Thinking skills of cadets. Based on the Pearson Chi-Square value of 14.483 with a significance of <0.001, it can be concluded that the more positive the boarding school system implemented, the better the critical thinking skills of cadets. The Linear-by-Linear Association test also supports this with a significance value of <0.001, indicating a strong linear relationship between the variables. Meanwhile, Fisher's Exact Test produced a significance value of 0.067, which, although slightly above the 0.05 limit, still indicates a tendency towards a significant relationship. Thus, the overall results of the

analysis support the hypothesis that the boarding school system influences the critical thinking skills of cadets**.**

**Table 2.** Linearity Test Results

| Source of Variation | df | Mean Square | F | Sig. |
|---|---|---|---|---|
| Linearity | 1 | 329.268 | 38.746 | < 0.001 |
| Deviation from Linearity | 6 | 20.416 | 2.402 | 0.068 |
| Within Groups | 23 | 8.498 | - | |

Based on Table 2, the analysis results show that the significance value in the Linearity row is $p < 0.001$, indicating a significant linear relationship between the Boarding School System and Critical Thinking. This is also demonstrated by the F-value of 38.746, which is quite large, indicating that the linear regression line provides a good explanation of the relationship between the two variables.

Furthermore, the significance value in the Deviation from Linearity row is $p = 0.068$, which is greater than 0.05. This indicates that there is no significant deviation from the linear relationship, so the linear model is considered appropriate and valid to explain the relationship between the two variables. Thus, it can be concluded that the relationship between the Boarding School System and cadets' Critical Thinking skills is linear and significant. This means that the more positive the boarding school system implemented, the higher the cadets' critical thinking skills.

**Table 3.** Results of the t-test (X against Y)

| Variable | B (Unstandardized) | Std. Error | t. | Sig. |
|---|---|---|---|---|
| (Constant / Intercept) | 16.417 | 5.741 | 2.860 | 0.008 |
| *Boarding School* System | 0.670 | 0.120 | 5.567 | <0.001 |

Based on table 3 above, it shows that the t value = 5.567 and significance <0.001 indicate that the influence of the Boarding School System on Critical Thinking is very significant statistically. Because the p value <0.05, the null hypothesis ($H_0$) is rejected, and the alternative hypothesis ($H_1$) is accepted, meaning there is a significant influence between variables X and Y.

### ***3.1.2*** *Factors that influence cadets' critical thinking*

Table 4 shows that all factors are above 79%, indicating a high level of influence on the development of cadets' critical thinking skills. The factor with the highest influence is guidance from teachers and mentors (84%). This indicates that direct guidance plays a significant role in developing cadets' critical thinking patterns.

**Table 4.** Factors that influence cadets' critical thinking

| No | Factor | Persentation % |
|---|---|---|
| 1 | Environmental Discipline | 80,0% |
| 2 | Social Life in the Dormitory | 81,0% |
| 3 | Intensity of Teacher and Supervisor Guidance | 84,0% |
| 4 | Extracurricular Activities | 81,0% |
| 5 | Educational Facilities | 79,0% |

## 3.2 Disscusion

The results of the study indicate that the boarding school system has a significant effect on the critical thinking skills of Diploma 3 Air Traffic Control cadets at the Surabaya Aviation Polytechnic, with a significance value of 0.000 (<0.05) and a correlation coefficient of 0.763 (strong positive relationship). The contribution of the boarding school variable to critical thinking was recorded at 58.2% while the remaining 41.8% was influenced by other factors outside this study. This finding supports the view of (Paul & Elder, 2014) that critical thinking develops through continuous practice in analyzing information and making evidence-based decisions. The disciplined, structured, and socially interactive boarding school environment provides cadets with the opportunity to practice analytical, evaluation, and reflection skills in both academic and non-academic situations. The difference in the level of critical thinking skills between level I and level III cadets is also in line with the theory of cognitive development (Vartiak et al., 2023), where experience and environmental adaptation play an important role in shaping mindsets.

The dominant factors influencing the improvement of critical thinking in a boarding school environment include discipline, social life, guidance from teachers and mentors, involvement in extracurricular activities, and educational facilities. In the context of aviation education, the combination of boarding school and semi-military training fosters discipline, leadership, and mental resilience, which support quick and accurate decision-making, essential competencies for prospective Air Traffic Controllers. Thus, the implementation of boarding school at the Surabaya Aviation Polytechnic has proven effective not only for character development but also in developing critical thinking skills that are crucial in the aviation workforce.

## 4. FIGURES AND TABLES

### 4.1 Validity Test

The validity of the instruments in this study was tested using IBM SPSS Statistics 29 software by conducting a bivariate correlation test using the product-moment correlation method. The validity test technique using the product-moment correlation method involves correlating the scores of each item with the total score, which is the sum of the scores for each item.

**Table 5.** Results of the Validity Test of Variable X

| Questionnaire Items | Pearson Correlation | Sig. (2-tailed) | Decision |
|---|---|---|---|
| P1 | 0.788 | < 0.001 | Valid |
| P2 | 0.731 | < 0.001 | Valid |
| P3 | 0.822 | < 0.001 | Valid |
| P4 | 0.822 | < 0.001 | Valid |
| P5 | 0.822 | < 0.001 | Valid |
| P6 | 0.936 | < 0.001 | Valid |
| P7 | 0.936 | < 0.001 | Valid |
| P8 | 0.904 | < 0.001 | Valid |
| P9 | 0.822 | < 0.001 | Valid |
| P10 | 0.822 | < 0.001 | Valid |

Based on Table 5, the results of the validity test using Pearson correlation, all items in the X variable instrument showed a correlation value above 0.3 and a significance value (Sig. 2-tailed) < 0.05. This indicates that all statements (P1–P10) have a significant relationship with the total score and are declared valid. Therefore, all questions are suitable for use in this study.

**Table 6.** Results of the Validity Test of Variable Y

| Questionnaire Items | Pearson Correlation | Sig. (2-tailed) | Decision |
|---|---|---|---|
| P1 | 0.871 | < 0.001 | Valid |
| P2 | 0.899 | < 0.001 | Valid |
| P3 | 0.845 | < 0.001 | Valid |
| P4 | 0.943 | < 0.001 | Valid |
| P5 | 0.885 | < 0.001 | Valid |
| P6 | 0.943 | < 0.001 | Valid |
| P7 | 0.912 | < 0.001 | Valid |
| P8 | 0.943 | < 0.001 | Valid |
| P9 | 0.967 | < 0.001 | Valid |
| P10 | 0.980 | < 0.001 | Valid |

Based on table 6, the results of the validity test, all statement items (P1 to P10) show a Pearson correlation value above 0.7 and have a significance below 0.05 (Sig. < 0.001), so it can be concluded that all instrument items are valid for measuring variable Y. This means that each question item has a significant and consistent relationship with the total instrument score.

### 4.2 Reliability Test

Reliability is an instrument that if used to measure the same object several times, the results will be the same data. The reliability of the instrument was tested with the help of IBM SPSS Statistics 29 software using the scale-reliability analysis test and the Cronbach alpha method. In Cronbach alpha, the criteria are as follows: less than 0.6 is not good, 0.6-0.79 is acceptable, and 0.8-1 is good (has high consistency).

**Reliability Statistics**

| Cronbach's Alpha | N of Items |
|---|---|
| .986 | 10 |

**Figure 1.** Reliability test results for variable x

Based on Figure 1, the Cronbach's Alpha value of 0.986 indicates that the instrument has a very high level of reliability. All items have a Corrected Item-Total Correlation value above 0.7, which means each item has a strong contribution to the total score. Furthermore, the Cronbach's Alpha value remains high (≥ 0.983), indicating that no items need to be removed to improve reliability. Thus, this questionnaire is highly reliable and can be trusted to measure the Boarding School System variable.

**Reliability Statistics**

| Cronbach's Alpha | N of Items |
|---|---|
| .985 | 10 |

**Figure 2.** Reliability test results for variable y

Based on Figure 2, the Cronbach's Alpha value of 0.985 indicates that the instrument has a very high level of reliability. All statement items have a Corrected Item-Total Correlation value above 0.8, indicating that each item contributes strongly to the total score. Furthermore, the Cronbach's Alpha value remains high (between 0.983–0.989), meaning that no item removal would significantly increase reliability. Thus, this instrument is highly reliable and consistent in measuring variable Y.

### 4.3 NormalityTest

A normality test is used to determine whether the collected data is normally distributed. Data normality is a basic requirement for parametric analysis. Normally distributed data represent the sample. The normality test in this study was assisted by IBM SPSS Statistics 29 with One-Sample Kolmogorov-Smirnov. Criteria: sig < 0.05 indicates non-normal data, sig > 0.05 indicates normal data.

**Chi-Square Tests**

| | Value | Df | Asymptotic Significance (2-sided) | Exact Sig. (2-sided) | Exact Sig. (1-sided) |
|---|---|---|---|---|---|
| Pearson Chi-Square | 14.483[a] | 1 | <,001 | | |
| Continuity Correction[b] | 3.122 | 1 | .077 | | |
| Likelihood Ratio | 5.996 | 1 | .014 | | |
| Fisher's Exact Test | | | | .067 | .067 |
| Linear-by-Linear Association | 14.000 | 1 | <,001 | | |
| N of Valid Cases | 30 | | | | |

a. 3 cells (75.0%) have expected count less than 5. The minimum expected count is .07.

b. Computed only for a 2x2 table

**Figure 3.** Normality Test Result

Based on figure 3, the results of the Chi-Square test show that there is a significant relationship between the Boarding School System and the Critical Thinking skills of cadets. Based on the Pearson Chi-Square value of 14.483 with a significance of <0.001, it can be concluded that the more positive the boarding school system implemented, the better the critical thinking skills of cadets. The Linear-by-Linear Association test also supports this with a significance value of <0.001, indicating a strong linear relationship between the variables. Meanwhile, Fisher's Exact Test produced a significance value of 0.067, which, although slightly above the 0.05 limit, still indicates a tendency towards a significant relationship. Thus, the overall results of the analysis support the hypothesis that the boarding school system influences the critical thinking skills of cadets**.**

### 4.4 Linearity Test

The purpose of the linearity test is to determine whether the influence between two variables is linear or not. This means that this test is used to ensure that the linear regression model being used truly fits the influence pattern of the data.

Based on the results presented in Figure 4, it can be observed that the analysis of variance for linearity produces a significance value of p < 0.001 in the Linearity row. This finding indicates that there is a statistically significant linear relationship between the Boarding School System variable and the Critical Thinking variable. A significance value this small, far below the conventional threshold of 0.05, provides strong evidence that changes in the Boarding School System variable are linearly associated with changes in Critical Thinking. This ensures that the data fit the assumptions required for applying linear regression

**ANOVA Table**

| | | | Sum of Squares | df | Mean Square | F |
|---|---|---|---|---|---|---|
| Berpikir Kritis * Sistem Boarding School | Between Groups | (Combined) | 431.345 | 6 | 71.891 | 8.460 |
| | | Linearity | 329.268 | 1 | 329.268 | 38.746 |
| | | Deviation from Linearity | 102.078 | 5 | 20.416 | 2.402 |
| | Within Groups | | 195.455 | 23 | 8.498 | |
| | Total | | 626.800 | 29 | | |

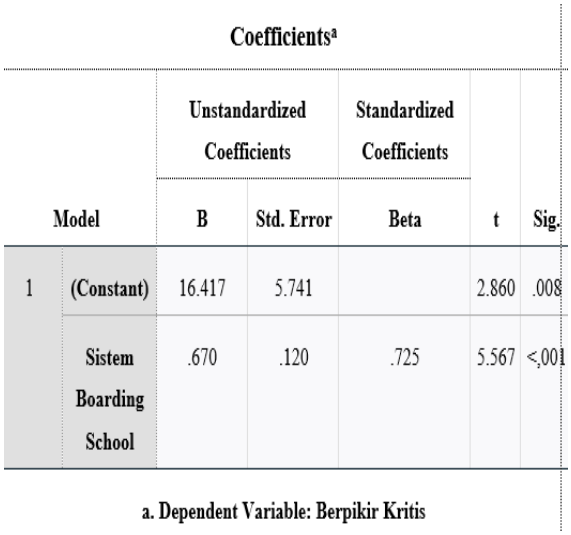
analysis, making the model appropriate for further interpretation.

**Figure 4.** Linearity Test Result

In addition to the significance value, the analysis also reveals an F-value of 38.746, which is relatively high. A large F-value suggests that the regression line is highly effective in explaining the variation observed in the dependent variable, namely Critical Thinking, as influenced by the independent variable, the Boarding School System. In other words, the regression equation derived from this analysis provides a good fit to the data, meaning that the model is capable of capturing the relationship between the two variables with a high degree of explanatory power. These results reinforce the conclusion that the implementation of the Boarding School System plays an important role in shaping or influencing the level of students' critical thinking skills.

### 4.5 Hypothesis Test

Hypothesis testing was conducted using simple linear regression analysis. This method is used to predict or test the effect of independent variables on dependent variables. All calculations were performed using SPSS statistical software.



Coefficients[a]

| Model | | Unstandardized Coefficients | | Standardized Coefficients | t | Sig. |
|---|---|---|---|---|---|---|
| | | B | Std. Error | Beta | | |
| 1 | (Constant) | 16.417 | 5.741 | | 2.860 | .008 |
| | Sistem Boarding School | .670 | .120 | .725 | 5.567 | <,001 |

a. Dependent Variable: Berpikir Kritis

**Figure 5.** Hypothesis Test Result

Based on figure 5 above, it shows that the t value = 5.567 and significance <0.001 indicate that the influence of the Boarding School System on Critical Thinking is very significant statistically. Because the p value <0.05, the null hypothesis ($H_0$) is rejected, and the alternative hypothesis ($H_1$) is accepted, meaning there is a significant influence between variables X and Y.

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We hope that Surabaya Aviation Polytechnic will continue to develop a boarding school approach that adapts to the dynamic needs of its cadets, while addressing mental, social, and cognitive balance that supports the development of comprehensive critical thinking.

## 6.CONCLUSION

Based on the results of the study on " The effect of the boarding school system on the critical thinking skills of cadets in the Diploma 3 Air Traffic Control at the Surabaya Aviation Polytechnic ", it can be concluded that the boarding school system has a significant influence on the critical thinking abilities of cadets.

The results of the hypothesis test analysis show a significance value of 0.001 (<0.05) and the calculated t-value is greater than the t-table, so $H_0$ is rejected and $H_1$ is accepted. This shows that the Boarding School System has a significant effect on the Critical Thinking skills of Diploma 3 Air Traffic Control Cadets at the Surabaya Aviation Polytechnic.

Furthermore, the factors within the boarding school system that most influence critical thinking are: environmental discipline, social life in the dormitory, the intensity of teacher and mentor guidance, extracurricular activities, and educational facilities. These factors support the development of analytical, evaluative, reflective, and independent thought patterns. Therefore, cadets who have been through the boarding school system for a longer period (level III) demonstrate more mature critical thinking skills than cadets at level I.

Educational management at the Surabaya Aviation Polytechnic is advised to maintain the excellence of the boarding school system, while simultaneously improving character development, strengthening academic and extracurricular activities, and optimizing supporting facilities. Particular attention should be paid to early-stage cadets to accelerate adaptation and foster early development of critical thinking potential. Further research is recommended to incorporate additional variables such as learning motivation, teaching methods, and family environment to provide a more comprehensive picture of the factors influencing cadets' critical thinking.

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