

Critical Thinking Analysis of Boarding and Regular Students in Physics Learning at MA NU Banat Kudus

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Abstract: MA NU Banat Kudus has two educational programs: boarding and regular classes. These two programs differ, particularly in terms of independence; boarding school students live in school dormitories, which require them to be independent in many aspects of daily life. In addition, education in boarding schools is divided into two types, namely diniyah learning and regular learning, while regular students only have regular learning. Critical thinking is also an important aspect that must be considered. This study aims to analyze the differences in critical thinking skills and learning independence attitudes between boarding school and regular class students in physics learning at MA NU Banat Kudus. The method used in this study is a mixed methods with a triangulation design, combining a quantitative approach through tests and a qualitative approach through interviews. The study population consisted of grade XI students, divided into two groups: boarding and regular. Quantitative data analysis was carried out using the T-test, while qualitative data were analyzed thematically. The results of the study showed that there was no significant difference in critical thinking between boarding school and regular students. Based on the t-test, a significant value of 0.67 was obtained, and the average results per aspect also showed no difference between boarding school and regular students. Meanwhile, the findings on student independence showed that boarding school students demonstrated better learning independence than regular students. This study recommends that schools develop more strategic planning for boarding programs to improve overall quality and implement active learning approaches, such as Problem-Based Learning, to enhance both critical thinking skills and learning independence among students in all types of schools.

Keywords: Critical Thinking, Boarding School, Regular School, Physics Education, PBL

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Introduction

Education is fundamental to a nation's progress; its progress can be measured by the quality of its education. Quality education will create the next generation with extensive skills and knowledge. Schools, as formal educational institutions, play a strategic role in shaping the quality of the younger generation so they can compete locally, nationally, and globally (Murtiningsih et al., 2024). Twenty-first-century education demands that students possess essential skills, one of which is critical thinking. This skill enables students to analyze information, evaluate arguments, and make logical decisions (Sya'diyah, 2024). Ennis (1985) states that there are five components of critical thinking skills: providing simple explanations, developing basic skills, drawing conclusions, providing further explanations, and formulating action plans (strategies and tactics) (Rohmawatiningsih et al., 2018). Indonesian students scored 383 in the 2022 PISA survey, which measures cognitive abilities in three domains: reading, mathematics, and problem-solving. This score is lower than the OECD average. Of the 70 countries participating in the poll, Indonesia ranked 62nd. Knowledge, comprehension, application, analysis, synthesis, and evaluation are the six levels of difficulty that make up the PISA questions. The contextual questions are drawn from the real world. However, Indonesian students were only able to answer these questions at the understanding and knowledge levels. This indicates that Indonesian students' critical thinking skills are still relatively inadequate.

One educational institution that plays a significant role in realizing this goal is the Islamic high school (*madrasah aliyah*), which specifically integrates general education with Islamic religious education. One

prominent example of an Islamic high school in Kudus Regency is MA NU Banat Kudus, an educational institution long known as a center for the development of knowledge and moral development. Madrasah Aliyah NU Banat Kudus has a unique educational program, consisting of boarding school and regular education. The regular system emphasizes the educational pattern typical of Islamic high schools, with teaching and learning taking place in classrooms at specific times. Meanwhile, the boarding school system provides a more intensive educational experience because students live in dormitories, so the learning process takes place not only in the classroom but also in everyday life (Hayriana et al., 2024). Both systems share the same goal: to produce a young generation that is intellectually intelligent, spiritually mature, and skilled in facing the challenges of modern life.

Critical thinking skills are an important aspect developed in learning at MA NU Banat. In today's era of globalization, students are no longer simply recipients of information; they are also required to analyze, evaluate, and solve problems logically. Critical thinking enables students to view a problem from multiple perspectives, consider available evidence, and make informed decisions based on rational reasoning (Rendi et al., 2024). Through critical thinking, students are expected to develop the ability to ask questions, discuss, express opinions, and respect differences (Mendrofa et al., 2024). This is certainly crucial for developing a young generation capable of facing changing times without losing their identity as noble Muslims. In addition to critical thinking, learning at MA NU Banat also emphasizes the development of independence. Independence is a person's ability to organize, manage, and be responsible for themselves, both academically, socially, and emotionally (Situmorang et al., 2025). For regular students, independence is developed through various activities that require them to manage their time, complete assignments, and make decisions in their daily learning. Meanwhile, in boarding schools, independence is more evident because students live in dormitories and are far from their parents. They must manage their personal needs, maintain hygiene, manage their study time, and interact with their peers in a healthy manner. One strategy to improve student character education, particularly in terms of encouraging independence, is through the boarding school curriculum itself (Akbar et al., 2022). The independence developed in boarding schools can help students develop self-confidence, initiative, and the ability to adapt to various situations (Widiandaru et al., 2024). Learning models are needed for physics subjects to develop and improve students' critical thinking skills in the classroom. Problem-Based Learning (PBL) is one such learning model. According to Minarti et al., (2023), the characteristics of problem-based learning (PBL) include the use of real-world situations or problems as learning tools to help students practice and improve their critical thinking and problem-solving skills, as well as understand important concepts.

The results of initial observations in MA NU Banat Kudus showed the same situation as in the PISA survey. Learning implemented by teachers emphasized aspects of knowledge and understanding, while aspects of application, analysis, synthesis, and even evaluation were only a small part of the learning carried out. Teachers have so far mostly given lectures and exercises to solve problems quickly without understanding the concepts in depth. This results in students being less trained to develop their reasoning skills in solving problems and applying the concepts they have learned in real life, so that students' critical thinking skills cannot develop properly. One subject that plays an important role in training critical thinking skills as well as learning independence is physics. Physics is seen as a complex subject. The physics learning process is not simply about memorizing formulas; it requires analysis, reasoning, and problem-solving. Therefore, physics learning is highly relevant as a medium for developing students' critical thinking and independent learning.

Many previous studies have been conducted to improve students' critical thinking and independent learning skills in physics. One example is a study using the PBL model with a scientific approach assisted by Fun Pict. The results showed that students who used this learning model had better critical thinking and independent learning outcomes (Early et al., 2018). According to Fitria et al., (2023), there is a positive relationship between critical thinking and independent learning, indicating that active and independent learners excel in critical thinking compared to passive learners. Students who are independent in learning are able to express and express their opinions and ideas clearly while learning and are able to construct their

knowledge independently. In accordance with the explanation above, information on students' critical thinking skills and independent learning attitudes is deemed important. Therefore, this study aims to analyze critical thinking skills and independent attitudes in physics learning among boarding and regular students at MA NU Banat Kudus.

Methods

This study employed a mixed methods research design. This research design employed concurrent mixed methods, a research design that combines qualitative and quantitative data to obtain a comprehensive analysis of the research problem (J. Creswell & Clark, 2010). The population in this study were 11th-grade students at MA NU Banat Kudus. Purposive sampling was used, with 95 students from three classes (one boarding school class and two regular classes) at MA NU Banat Kudus.

The instruments used in this study were 15 essay questions to measure students' critical thinking, while interviews were used to measure student independence. Data analysis was conducted using SPSS to test the research hypotheses. All parametric assumption tests were conducted at a significance level of 5%.

Results and Discussion

The results of this study consist of 1) analysis of critical thinking of boarding school and regular students in physics learning at MA NU Banat Kudus; 2) analysis of the independent attitudes of boarding school and regular students in physics learning at MA NU Banat Kudus; 3) analysis of differences in critical thinking and learning independence of boarding school and regular students in physics learning at MA NU Banat Kudus.

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Learning tools are used to optimize classroom learning. These tools include teaching modules, questionnaires, and static fluid problems. These instruments are assessed by several validators.

Table 1. Instrument Analysis

| Instrument | Validator 1 (%) | Validator 2 (%) | Validator 3 (%) | Average (%) | Criteria |
|---------------------|-----------------|-----------------|-----------------|-------------|------------|
| PBL teaching module | 80 | 78 | 83 | 80.3 | Worthy |
| Physics questions | 84 | 84 | 98 | 88.7 | Very worth |
| Interview | 82 | 80 | 85 | 82.3 | Worthy |

The analysis results indicate that the above instrument is suitable for use as a support for this research. The PBL teaching module was analyzed by three validators with a score of 80.3%, the criteria for being worthy for use in the classroom as a teacher's teaching guide. Static fluid questions were analyzed with a score of 88.7%, the criteria for being very worthy. The independent learning interview was analyzed with a score of 82.3%, the criteria for being worthy.

The validity test in this study was carried out using the Statistical Package Social Science (SPSS) 22.00 program with the test criteria that if the correlated item-total correlation is greater than 0.5, then the data is a strong construct (valid).

Table 2. Validity Analysis Results

| Criteria | Question number | Number of questions |
|-----------|---|---------------------|
| Valid | 1,5,7,8,9,10,11,12,13,14,15,16,17,18,19 | 16 |
| Non-Valid | 2,3,4,6 | 4 |

Analysis of 16 valid questions. Valid questions meet the research criteria; each valid question item, based on the analysis results, is categorized as valid and can be used. Four invalid questions were due to inaccuracy in the question formulation and were too difficult for students to understand.

Item Reliability

The reliability test of this research used the Statistical Package Social Science (SPSS) 22.00 program.

Table 3. Reliable Analysis for Static Fluid Problems

| Reliability Statistics | |
|------------------------|------------|
| Cronbach's Alpha | N of Items |
| 0.922 | 20 |

The results of the question analysis r_{11} is greater than r_{tabel} $N = 20$ and the significance is 0.576 is 0.922 > 0.576 which means that the question instrument is reliable, so it can be used as a reliable data collection tool.

T-Test and N-Gain Test

To test a sample that received treatment, the average results before and after treatment were compared. In this study, the T-Test used SPSS software version 22.00. The results of the T-Test data on critical thinking for boarding school and regular school students are explained in Table 4.

Table 4. T-test Results

| Result | Levene's Test for Equality of Variances | | t-test for Equality of Means | | | | | 95% Confidence Interval of the Difference | |
|-----------------------------|---|-------|------------------------------|--------|-----------------|-----------------|-----------------------|---|-------|
| | F | Sig. | t | df | Sig. (2-tailed) | Mean Difference | Std. Error Difference | Lower | Upper |
| Equal variances assumed | 0.015 | 0.904 | -0.42 | 67 | 0.676 | -0.583 | 1.39 | -3.357 | 2.191 |
| Equal variances not assumed | | | -0.42 | 66.677 | 0.676 | -0.583 | 1.389 | -3.355 | 2.189 |

The results of the analysis of critical thinking of regular Madrasah Aliyah and boarding school students can be explained that the influence of critical thinking aspects on boarding school and regular students obtained a significance value of 0.676 which indicates that the significance value is more than $\alpha = 0.05$, so H_0 is accepted. This shows that critical thinking aspects have no effect between boarding school and regular classes.

To determine the interaction between critical thinking aspects of boarding school and regular school students statistically, an N-gain test was used. The results of the N-gain test of critical thinking data for boarding school and regular school students are explained in Table 5.

Table 5. N-gain test results

| No | Aspect | N-gain | Criteria |
|----|----------|--------|----------|
| 1 | Aspect 1 | 0.01 | Low |
| 2 | Aspect 2 | 0.33 | Low |
| 3 | Aspect 3 | 0.15 | Low |
| 4 | Aspect 4 | 0.32 | Low |
| 5 | Aspect 5 | 0.45 | Medium |

The influence of critical thinking aspects on boarding school and regular students obtained n-gain values, namely aspect 1 is worth 0.01, aspect 2 is worth 0.33, aspect 3 is worth 0.15, aspect 4 shows a value of 0.32 and aspect 5 shows a value of 0.45. These results indicate that the n-gain value is less than $\alpha = 0.3$, and only aspect 5 shows more than 0.3, so H_0 is accepted. This shows that critical thinking aspects do not have a significant direct effect on boarding school and regular students.

Apart from the n-gain test, the influence of critical thinking aspects on boarding school and regular school students can also be shown through the bar chart below.

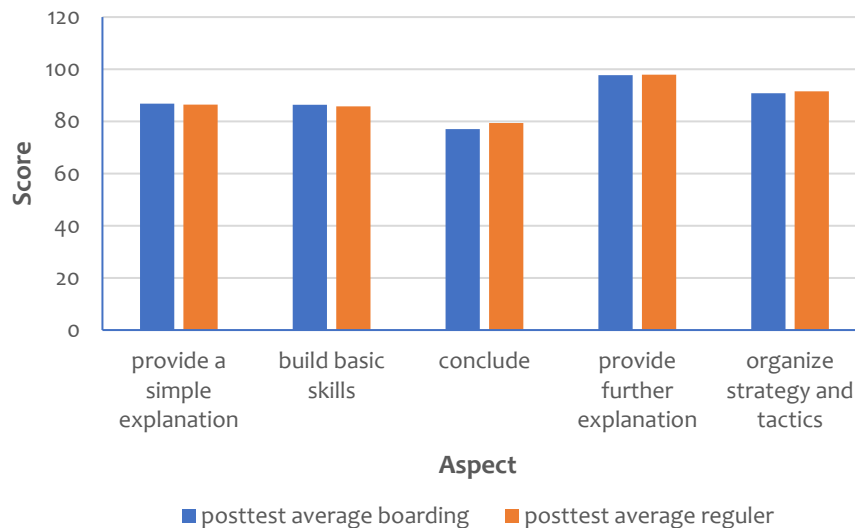


Figure 1. Average Critical Thinking Skills Boarding and Regular Students

Based on the bar chart in Figure 1, it can be seen that the average critical thinking ability of boarding school and regular students is almost the same in every aspect of the average pretest results. Aspect 1 is represented by questions number 1, 2, 12, aspect 2 in question number 9, aspect 3 in questions number 4, 5, 6, 10, 13, 15, aspect 4 in question number 9, and aspect 5 in questions number 3, 7, 8, 14. In the aspect of providing a simple explanation, the post-test score of boarding school students shows 86.78 and regular students is 86.46, which shows that the score of boarding school students is almost the same as regular students. A similar thing happened in the aspect of building basic skills, where boarding school students obtained an average score of 86.36, while regular students 85.75. Furthermore, in the aspect of concluding, the average score of boarding school students is 77.1 and regular students is 79.4, which shows that regular students are superior to boarding school students. In terms of providing further explanation, the post-test scores for boarding school students were 97.73 and those for regular students were 97.9. Furthermore, in terms of managing strategies and tactics, the boarding school students scored 90.78 and those for regular students 91.55, indicating that regular students outperformed boarding school students. These results indicate no significant difference in the average post-test scores between boarding school and regular students.

Boarding school students can understand the learning problems they encounter during their lessons. This research is supported by research by Ardiyanto et al., (2021), which states that students with a high level of learning independence can meet all indicators of mathematical critical thinking skills. Meanwhile, regular students can understand the learning problems they encounter during their lessons. Some boarding school students can draw accurate conclusions during the learning process. This research is supported by Benyamin et al., (2021) study, which states that students are classified as moderate in assessing the credibility of statements, knowledge, conditions, judgments, beliefs, or opinions; and in assessing the actual relationship between statements, descriptions, questions, or reasonable representations. Meanwhile, regular students

can draw accurate conclusions during the learning process. This is in accordance with research by Alir & Fauziyah, (2024), who found that at the conclusion-drawing stage, students re-examine each step of the solution and the answers obtained before drawing conclusions. Furthermore, these students are able to write conclusions correctly based on the questions given.

Meanwhile, the analysis of learning independence of boarding school and regular school students is explained in Table 6.

Table 6. Analysis of the Independence Attitudes of Boarding School and Regular School Students

| No | Learning Independence Indicators | Class | |
|----|----------------------------------|--|--|
| | | Boarding School | Reguler |
| 1 | Self-confident | Dare to express your opinion | Dare to express your opinion |
| 2 | Willingness to learn | Dare to ask the teacher when you don't understand the material | If there is material that you don't understand, ask a friend, because you are afraid to ask the teacher. |
| 3 | Initiative in learning | Keep studying if you have free time, do your assignments by discussing them with friends. | Study if there is homework or if there will be a test |
| 4 | Responsibility in learning | Do assignments close to the deadline, if there is an assignment do it yourself first, if you have difficulty discuss it with friends | Try to do assignments early if you have free time. |

Based on interview data, these qualitative findings reinforce the quantitative findings that boarding school students demonstrate a higher level of independent learning than regular students. Self-confidence, a willingness to learn, initiative, and responsibility are factors that qualitatively explain this superiority. Furthermore, interviews with boarding school students demonstrated that boarding school students demonstrated indicators of independent learning, including self-confidence, willingness to learn, initiative, and responsibility. This research aligns with research by Khoiruzzadi & Luqmanul Hakim, (2020), who stated that students' self-awareness, which encourages them to consistently strive for excellence, strengthens their sense of independence in boarding school.

There are several students who have not met the category in the self-confidence indicator. This research is in accordance with the research of Rohman & Noer, (2023) which states that the stages of educators in fostering student learning independence through the semi-boarding school program, students have been implemented well but there are still several things that affect the stimulus response of students, including the level of independence of students who still have not instilled self-confidence in themselves and still depend on other students in the process of doing independent assignments. In the indicator of willingness and initiative in learning, students re-study the material when there is homework or during tests, if they do not understand the material, then what is done is read the material again or watch videos on YouTube. In accordance with research by Anjani et al., (2024) is stated that the dormitory environment makes students experience many behavioral changes, especially in attitudes of independence which include emotional independence (referring to students' ability to control emotions and not depend on the emotional needs of others), economic independence (referring to students' ability to manage finances or finances) intellectual independence (referring to students' ability to overcome various problems faced and related to thinking or learning abilities), and social abilities (referring to students' ability to interact and communicate with others without dependence on others).

The difference in critical thinking skills and independent attitudes of regular Madrasah Aliyah and boarding school students is explained by a T-test that the influence of critical thinking aspects on boarding school and regular students obtained a significance value of 0.676 which indicates that the significance value is more than $\alpha = 0.05$, so that H_0 is accepted which means there is no significant difference between boarding

school and regular classes. The absence of this difference could be caused by several factors, including: Boarding school students are not students who have a background of highly competent students; the competitive environment of boarding schools can create high academic pressure, which can trigger stress and anxiety in students. So it is expected that this research and recommendations are as follows (Misraini et al., 2024): Strategic planning of boarding schools in improving the quality of schools/madrasas; Implementation of strategic boarding schools in improving the quality of schools; Evaluation of strategic boarding schools in improving the quality of schools; Supporting and inhibiting factors in strategic boarding schools in improving the quality of schools.

Conclusion

Based on the research results and discussion, it can be concluded that critical thinking skills based on data from the T-test which explains that the influence of critical thinking aspects on boarding school and regular school students obtained a significance value of 0.676, indicating that the significance value is more than $\alpha = 0.05$, so that H_0 is accepted, meaning there is no significant difference between boarding school and regular classes. The attitude of learning independence of MA NU Banat Kudus boarding school students is higher than that of regular students. Based on the interview results provided in the source triangulation data and technical triangulation.

The absence of this difference can be caused by several factors, including: (1) Boarding school students do not have a background of highly competent students. (2) The competitive boarding school environment can create high academic pressure, which can trigger stress and anxiety in students.

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