Influences on Critical Thinking Skills Among Indonesian Secondary Students: An Empirical Analysis

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Abstract
This study examines the factors influencing the development of critical thinking skills among Indonesian secondary students, with a focus on teaching methods, school leadership, and socio-economic factors. Despite the introduction of student-centred learning in the 2013 curriculum, traditional rote learning continues due to insufficient teacher training and inconsistent implementation. The research identifies several key influences on critical thinking, including preschool attendance, project-based learning, parental education, school type, and school management practices. A cross-sectional survey was conducted among 1,020 students from 74 schools in the Bandung Raya region, using structured questionnaires to assess critical thinking through academic and non-academic activities. The study finds that preschool attendance and project-based learning are the most significant predictors of critical thinking skills. It also highlights that student from higher-income families, those with educated parents, and those attending schools with participative management practices tend to perform better. The findings suggest that improving early education, teaching approaches, and school environments is crucial for enhancing critical thinking in Indonesia.

Keywords: Critical Thinking Development, Indonesian Secondary Education, Project-Based Learning

Introduction

Indonesia's education system faces significant challenges, particularly in fostering critical thinking skills. A major issue is the dominance of rote learning, where students are treated as passive recipients rather than active creators of knowledge (Attard, 2010). This limits their ability to develop critical thinking, which is essential for problem-solving, creativity, and lifelong learning. Teacher-centred instruction, where students are expected to memorize rather than engage with the material, remains common in Indonesian classrooms (Suryadi & Budimansyah, 2016).

The 2013 curriculum reform attempted to introduce student-centred learning to address these challenges (Muhammad et al., 2023). However, inconsistent implementation due to inadequate teacher training and ineffective leadership has perpetuated traditional methods (Suryadi & Budimansyah, 2016). As a result, Indonesian students consistently perform poorly on international assessments like PISA, particularly in reading, mathematics, and science, which all require critical thinking and problem-solving skills (OECD, 2018).

Furthermore, the lack of emphasis on critical thinking in the Indonesian education system contributes to broader societal challenges. In an increasingly globalized and competitive world, the ability to think critically is crucial for personal and professional success. Indonesian students, who are not sufficiently trained in these skills, may find themselves at a disadvantage compared to their peers in other countries where education systems prioritize critical thinking and problem-solving from an early age.

The present study titled "Influences on Critical Thinking Skills Among Indonesian Secondary Students: An Empirical Analysis" seeks to explore the factors that influence the development of critical thinking skills in Indonesian secondary students. By analysing the role of teaching methods, school leadership, and socio-economic factors, this study aims to provide insights into how Indonesian education can evolve to better support critical thinking. Understanding these influences is vital for creating policies and practices that can shift the focus from rote memorization to deeper learning, thereby improving student outcomes and addressing the country's education quality crisis. This study aims to contribute to this ongoing conversation by providing empirical evidence on the factors that can enhance critical thinking skills among Indonesian students.

Perspectives on the Development of Critical Thinking Skills

Critical thinking, the ability to reflect and make reasoned judgments, is essential for senior secondary students facing complex academic and social challenges (Fisher, 2020). Theoretical perspectives from cognitive development to sociocultural influences explain how these skills emerge. Jean Piaget’s Cognitive Developmental Theory suggests that in adolescence, students develop abstract reasoning, enabling them to approach problems logically and from multiple angles (Bjorklund, 2020; Anderson & Kratwohl, 2022). Activities like problem-solving and inquiry-based learning foster critical thinking by encouraging students to evaluate evidence and integrate ideas (Ginsburg & Opper, 2021).

Lev Vygotsky’s Sociocultural Theory emphasizes that social interaction is key to learning. Through engagement with teachers or peers, students are guided within the "zone of proximal development" (ZPD) to achieve higher levels of thinking (YURTTAŞ Dilay et al., 2022). Collaborative activities such as group discussions and peer feedback nurture critical thinking

by exposing students to diverse perspectives. In the modern context, digital tools play a role in this development, as students learn to critically evaluate online information (Selwyn, 2022).

The information processing theory compares the brain to a computer, highlighting how students manage cognitive tasks like filtering relevant information and handling complex ideas (Anderson & Kratwohl, 2022). Metacognitive strategies, which involve students monitoring and regulating their thinking, are key to enhancing critical thinking (Flavell, 2020). In an era of rapid technological change, critical thinking is increasingly important, helping students adapt to new information and the demands of the evolving workforce.

Pedagogical approaches such as inquiry-based, problem-based, and project-based learning are effective at promoting critical thinking. Inquiry-based learning encourages students to explore open-ended questions and assess multiple sources of information (Hattie, 2020). Problem-based learning presents real-world challenges requiring active problem-solving, while project-based learning allows students to apply interdisciplinary knowledge to extended tasks (Bell, 2019; Hmelo-Silver, 2019; Savery, 2019). However, one of the challenges with these methods is ensuring that they are implemented effectively. Inconsistent teacher training and resource limitations can hinder the proper application of these techniques, leading to superficial engagement rather than deeper learning. Additionally, while these methods encourage autonomy, students may struggle without proper guidance, risking confusion and lower engagement.

Experiential learning, which integrates real-world experiences into the learning process, also contributes to critical thinking development (Ginsburg, H.P, 2020). By engaging in hands-on activities, students can connect theoretical knowledge to practical applications (Bell, 2019; Savery, 2019). However, challenges in providing meaningful experiences across diverse educational settings can limit the impact of experiential learning. Variations in resources and opportunities, particularly in less privileged schools, can result in unequal access to such learning experiences, further contributing to disparities in critical thinking development.

Socioeconomic background, parental involvement, and school environment also shape critical thinking development. Students from higher-income families typically have greater access to resources like books and technology, which supports critical thinking (Reardon, 2011). Parental involvement, especially in discussions about current events or encouraging independent thought, plays a vital role in developing these skills (Jeynes, 2020). Schools that emphasize collaboration, inquiry, and independent learning are more likely to foster critical thinking (Darling-Hammond et al., 2019).

Teacher-student relationships are another critical factor. Teachers who model critical thinking through questioning and facilitating discussions can significantly influence students' cognitive growth. A classroom environment that encourages students to express and challenge ideas is vital for nurturing critical thinking (Zhao, 2017).

In conclusion, the development of critical thinking among senior secondary students is influenced by cognitive, sociocultural, and environmental factors. While problem-, project-based, and experiential learning hold promise, ensuring their proper implementation remains a challenge. As technological advancements and global challenges continue to reshape the future, integrating critical thinking into education is crucial for preparing students to navigate the complexities of lifelong learning and the modern workforce.

Research Methodology

This study used a cross-sectional survey to examine senior secondary schools in Bandung Raya, employing structured questionnaires. The goal was to assess how well students developed critical thinking skills through academic and non-academic activities. Critical thinking, as defined by Livermore (2009), involves the ability to analyse and collaborate across diverse perspectives, essential for fostering global citizenship. It is a key marker of successful school reforms promoting independent thinking and problem-solving (Mercer, et al. 2021).

This study gathered data through an entirely online, Google-based questionnaire, designed around Livermore's critical thinking construct and further refined using a four-scale critical thinking indicator. In collaboration with the West Java Provincial Department of Education, the team selected schools using systematic random sampling methods. Researchers also worked closely with the headmasters of the chosen schools to ensure that as many students as possible participated in completing the questionnaire.

The survey covered 74 randomly selected schools across three districts in the Bandung Raya region, including both general and vocational schools. A total of 1020 students from 69 schools were sampled, with Cimahi Municipality being excluded due to a low response rate. While the sample was not perfectly proportional between public and private schools, it provided a balanced representation of the various curriculum types and school categories in the region. This broad sampling enabled the study to offer comprehensive insights into the differences between curriculum structures and how they impact the development of critical thinking skills in students.

Results and Discussion

The demographic profile of respondents from the Bandung Region in West Java, Indonesia, reflects a diverse student population. Gender distribution shows that 58.8% were female, indicating a slightly higher female enrolment in the sampled schools. Most students were 16 years old (43.2%), followed by 17-year-olds (29.0%), with smaller percentages for other age groups. This suggests the survey primarily captured students in their mid-high school years, a crucial period for educational and career decisions. In terms of grade level, 46.0% were in Grade 11, 36.8% in Grade 10, and 17.3% in Grade 12, further emphasizing that many respondents were midway through secondary education.

School type and status also offer valuable insights. Public vocational secondary schools accounted for 40.1% of respondents, while 39.2% attended public general secondary schools which is balanced to the student and school profiles. Private schools represented smaller proportions, with 15.6% in private general and 5.2% in private vocational schools, highlighting a strong reliance on public education and a notable emphasis on vocational training. Most respondents were from urban areas (83.3%), and the rests were from rural areas, reflecting the Bandung Region is now becoming metropolitan areas and more urban-centred educational access in Bandung. Regarding family income, 46.5% came from middle-income households, with a majority of students also having early childhood education (73.6%), underscoring its role in shaping their academic paths. Parental education levels were varied, with 45.1% of parents having completed senior secondary education, and 33.8% holding a diploma or bachelor's degree.

Overall, these demographic insights reveal a predominantly urban, middle-income student population, with diverse educational backgrounds and parental education levels shaping their academic experiences in the Bandung Region. This reflect that the development of critical thinking has not only been affected by schools but also home and demographic factors.

Factors That Impact the Variability of Global Mindset Scores

The multiple regression model is employed in the analysis of influencing factors on the critical thinking scores of Indonesian senior secondary students. The model was built to assess how students' characteristics (such as gender, age, grade level, and preschool education), demographic profiles (including rural-urban residence and family socio-economic status), and school-related factors (such as school management, learning content, teacher competence, and learning approach) interact in shaping students' critical thinking measures. The analysis indicates that the model explains 17,9% of the variance in students' critical thinking which is considrably high in social reserach but remains ssignificant.

The findings provide insights into which factors play a critical role in shaping students' global awareness, suggesting a complex interaction of personal, familial, and educational influences. The results of regression model are described in Table 1.

Table 1: Impacts of Demographic and School Factors on Indonesian Secondary Students' Critical Thinking Skills

Regression Model		Beta	t	Sig.
(Constant)			-6.602	.000
1.	Sex of student	.037	1.290	.197
2.	Age of Student	.072	1.665	.096*)
3.	Preschool attendance	.114	3.759	.000**)
4.	Monthly Family Income	.033	.942	.346
5.	Parental Education	.075	2.101	.036*)
6.	Grade Level	-.056	-1.236	.217
7.	School Type	.072	2.194	.028*)
8.	School Status	-.023	-.756	.450
9.	Participative School Management	.098	2.841	.005*)
10.	Learning Content	.075	2.225	.026*)
11.	Teacher Credential	-.015	-.440	.660
12.	Project-based learning	.308	10.168	.000**)

Dependent Variable: critical thinking score; p. 0,05*); p. 0.001**)

The regression analysis identifies several key factors that significantly influence critical thinking scores among senior secondary students. Notably, preschool attendance and project-based learning emerge as the most impactful predictors. The analysis shows that preschool attendance has a strong positive coefficient ($B=2.032$, $p<.001$), indicating that students who attended preschool score significantly higher in critical thinking assessments. This underscores the importance of early educational experiences, as research suggests that preschool environments, which emphasize play and exploration, foster foundational cognitive skills that benefit students in later academic contexts (Whitebread et al., 2015).

Similarly, project-based learning has a strong positive effect ($B=1.364$, $p<.001$), underscoring its effectiveness in enhancing critical thinking skills. This approach engages students in real-

world problem-solving and collaborative projects, fostering deeper cognitive engagement by requiring them to analyze and apply knowledge in meaningful ways (Thomas, 2000; Pajares et al., 2006). This is especially relevant in an era of disruption and change driven by digitalization in all aspects of life (Schwab, 2016). The high t-value of 10.168 further reinforces the significance of this predictor, indicating a strong level of statistical reliability.

The type of school (private vs. public school) attended also correlates positively with critical thinking scores (B=1.283, p=.028). This suggests that the school environment can significantly impact students' cognitive development. Different school types often offer varying resources and teaching approaches, which can lead to differences in student outcomes. This study demonstrates that the public-school environment has a more positive impact on the development of students' critical thinking skills. Evidence indicates that students in resource-rich mostly in public schools may receive more individualized attention, contributing to improved critical thinking outcomes (Cain, 1983).

Parental education levels show a significant positive relationship with critical thinking scores (B=0.706, p=.036). This implies that students with more educated parents tend to perform better in critical thinking assessments. Educated parents are more likely to create intellectually stimulating environments at home, fostering critical engagement and academic support (Sirin, 2005). Parents with higher education levels often possess greater cultural capital, that significantly influences children's academic performance and cognitive development (Lareau, 2011; Pajares et al., 2006). This cultural capital may manifest in various forms, educated parents are more likely to introduce their children to books, educational activities, and experiences that not only enhance their children's critical thinking skills but also contribute to their overall academic success.

Effective school management plays a crucial role in enhancing students' critical thinking abilities. The analysis reveals a positive coefficient for school participative management (B=0.415, p=.005), indicating that schools with strong participative management practices are associated with higher critical thinking scores. Research has shown that effective leadership positively influences educational outcomes, including critical thinking (Leithwood et al., 2004). Schools managed in a participative manner increase the likelihood that students will engage in school activities, which can further boost their critical thinking skills.

Furthermore, learning content positively impacts critical thinking scores (B=0.415, p=.026). Students who achieve higher scores in critical thinking assessments are often engaged in problem- or project-based learning activities that focus on thematic and relevant issues. This underscores the importance of a curriculum that promotes critical analysis and the application of knowledge, which is essential for developing cognitive skills (Resnick, 1987). The t-value of 2.225 indicates that this relationship is statistically significant, highlighting the need for rigorous educational content.

While some factors, such as the sex of the student (p=.197) and age (p=.096), did not show significant effects on critical thinking scores, this suggests that educational experiences may outweigh demographic variables in influencing cognitive development. This aligns with findings that indicate the educational experiences received in school might be more critical than gender differences in determining students' critical thinking abilities (Lareau, 2011).

Teacher credential did not affect significantly on student's critical thinking scores effect (B=-.440, p<.660). Other research suggests that the effectiveness of a teacher is more closely

linked to their instructional practices than to their formal credentials. For example, teachers who employ active learning strategies—such as inquiry-based or project-based learning—are more likely to enhance critical thinking skills among their students, regardless of their academic qualifications (Darling-Hammond et al., 2019). This aligns with findings that show pedagogical approaches have a greater influence on student outcomes than mere credentials (Hattie, 2020).

In conclusion, this analysis highlights the multifaceted nature of critical thinking development among senior secondary students. The significance of early childhood education, innovative teaching methods like project-based learning, and supportive family and school environments indicate that a comprehensive approach is essential for fostering critical thinking skills. Promoting these factors could lead to substantial improvements in students' cognitive abilities, better preparing them for future academic and life challenges.

Conclusion

The article "Influences on Critical Thinking Skills Among Indonesian Secondary Students" examines the challenges within Indonesia's education system, particularly its reliance on rote learning and teacher-centred instruction, which hinders the development of critical thinking. Despite efforts to introduce student-centred learning through the 2013 curriculum reforms, poor implementation due to insufficient teacher training has perpetuated traditional methods. This has led to Indonesian students performing poorly in international assessments like PISA, where critical thinking is essential.

The study identifies factors that significantly influence critical thinking development, including preschool attendance, project-based learning, and participative school management. Early childhood education and innovative teaching methods like project-based learning show strong positive impacts on students' critical thinking abilities. Socioeconomic status, parental education, and school environments also play critical roles, with students from more privileged backgrounds generally having better access to resources that foster cognitive development. However, factors like gender and teacher credentials were not found to significantly affect critical thinking outcomes.

The study suggests that a comprehensive approach is necessary to improve critical thinking among Indonesian students, emphasizing the need for more effective teacher training, better school management, and equitable access to educational resources.

For future research, it is recommended to explore how digital tools and technologies can further enhance critical thinking in Indonesian classrooms. Additionally, longitudinal studies could provide deeper insights into the long-term impact of early childhood education and innovative pedagogical approaches on students' critical thinking development across different regions and socio-economic backgrounds. This would help refine strategies to bridge the gap between privileged and underprivileged schools in Indonesia.

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