

**International Journal of Education Management, Leadership, and
Organisational Studies****ANALYSIS OF STUDENTS' CRITICAL THINKING AND
PROBLEM-SOLVING SKILLS IN 21ST CENTURY LEARNING
AT SMA NEGERI 1 GORONTALO UTARA****Feybi Octaviani Tanipu^{1*}, Deya Rahmatia H. Anuli²**SMA Negeri 1 Gorontalo Utara, Gorontalo, Indonesia
Universitas Negeri Gorontalo, Indonesia***feybitanipu26@gmail.com****Received:** 19/07/2025 **Accepted:** 26/07/2025 **Published:** 31/07/2025**Abstract**

This study explores critical thinking and problem-solving skills among eleventh-grade students at SMA Negeri 1 Gorontalo Utara, focusing on the Computer Networking curriculum within a 21st-century learning framework. Rapid global changes demand skills to navigate complex challenges, yet Indonesian education, particularly in rural areas, often prioritizes rote learning, limiting analytical development. This research aims to assess students' critical thinking and problem-solving abilities, identify challenges, and propose improvements. A descriptive qualitative approach was employed, collecting data through classroom observations, teacher interviews, and document analysis over two weeks in May 2025. Findings reveal students excel in providing clear, logical explanations, with 90 percent demonstrating effective communication in network-related discussions, and collaborating on solutions, scoring 3.5 out of 4. However, they struggle with evaluating arguments, scoring 2.7, drawing independent conclusions, achieved by 50 percent, and proposing strategies, achieved by 40 percent, indicating metacognitive weaknesses. Challenges include limited reflective practice, inadequate technological resources, and short class durations. The study concludes that while students show promise, targeted interventions are needed to deepen analytical skills. Recommendations include integrating project-based learning with local network issues, enhancing teacher training in facilitation, and improving technological access. This research offers insights for educators and policymakers to strengthen skill development, preparing students for digital-era demands in rural Indonesian contexts.

Keywords: *critical thinking, problem solving, 21st-century learning***Introduction**

In the era of rapid globalization and digital transformation, the demand for individuals equipped with higher-order thinking skills has never been greater. The 21st century presents a landscape marked by complex challenges ranging from technological disruption to socio-economic inequalities which require not only intelligence but also



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the ability to think critically, collaborate effectively, and solve problems innovatively. These competencies have become essential not just for navigating everyday life, but also for thriving in an increasingly interconnected world (Trilling & Fadel, 2009).

Responding to this reality, the concept of 21st-century learning has emerged as a global educational paradigm, emphasizing the integration of the so-called 4Cs Critical Thinking, Communication, Collaboration, and Creativity into classroom practices (Partnership for 21st Century Learning, 2019). These core skills aim to prepare students to be adaptive learners who can analyze information, generate ideas, and participate meaningfully in collaborative environments.

Despite the global shift toward this transformative educational model, its implementation in Indonesia still faces significant challenges, particularly in remote and underserved regions such as Gorontalo. The education system in these areas often remains entrenched in traditional pedagogical approaches that prioritize rote learning over inquiry-based exploration. As a result, students are frequently underexposed to tasks that demand reasoning, reflection, and independent problem-solving (Indraswati et al., 2020). This systemic issue is reflected in Indonesia's ranking in the 2018 Programme for International Student Assessment (PISA), where it placed 74th out of 79 countries in literacy indicating widespread deficiencies in critical thinking and analytical skills (OECD, 2019).

Moreover, the World Bank's Indonesia Education Flagship Report (2020) emphasizes that many Indonesian schools continue to focus on boosting cognitive test scores rather than nurturing comprehensive intellectual growth. In rural regions, the lack of teacher capacity, limited access to learning resources, and infrastructural constraints further hinder the development of 21st-century competencies.

Within this context, SMA Negeri 1 Gorontalo Utara presents a unique case. As one of the first public schools in the region to implement aspects of the revised 2013 Curriculum including project-based and collaborative learning models it offers a valuable opportunity to investigate how 21st-century skills are being cultivated in real classroom settings (Kemendikbud, 2016). However, early observations suggest that while instructional strategies have evolved, students still encounter difficulties in

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constructing logical arguments or formulating effective solutions to open-ended problems. This indicates a potential disconnect between pedagogical intentions and actual learning outcomes.

To address this issue, it is necessary to conduct a focused inquiry into how critical thinking and problem-solving skills are developed among students at SMA Negeri 1 Gorontalo Utara. This research is particularly relevant for informing educational strategies in similar contexts, where systemic barriers often complicate curriculum reform. Drawing upon the theoretical lens of constructivism particularly Vygotsky's (1978) emphasis on the social nature of learning this study seeks to examine how collaborative learning environments can foster critical cognitive competencies. It also considers contemporary educational challenges and policy shifts to better understand the institutional and instructional dynamics at play.

Accordingly, this research aims to provide a comprehensive description of students' critical thinking and problem-solving skills in the context of 21st-century learning at SMA Negeri 1 Gorontalo Utara. The study not only seeks to reveal existing gaps between policy and practice but also aspires to offer meaningful insights for educators and decision-makers striving to enhance the quality of education, especially in rural settings.

Literature Review**21st-Century Learning**

Twenty-first-century learning is an educational paradigm aimed at preparing students for a dynamic, interconnected world. It emphasizes the development of higher-order thinking, collaboration, communication, and creativity (Trilling & Fadel, 2009). The Partnership for 21st Century Learning (2019) identifies the 4Cs as core competencies critical for success in the digital age. This approach shifts the focus from passive memorization to active engagement, encouraging students to question, evaluate, and create skills aligned with constructivist principles (Vygotsky, 1978).

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In Indonesia, adopting this paradigm faces significant hurdles. Traditional lecture methods and rote-based assessments remain prevalent, particularly in remote areas, limiting opportunities for critical and reflective thinking (Siwati & Corebima, 2021). The revised 2013 Curriculum seeks to address this by promoting competency-based learning (Kemendikbud, 2016), yet its implementation varies widely. In Gorontalo, factors such as limited technological access and teacher readiness pose additional challenges (Rosnaeni, 2021). Contextualizing 21st-century learning to local realities such as using regional issues as learning material could bridge this gap while preserving cultural identity.

The Fourth Industrial Revolution further underscores the urgency of this shift, demanding human resources capable of adapting to technological and societal changes (Oktarina et al., 2021). Education must therefore evolve to foster not just knowledge but transformative skills, enabling students to thrive in an era of rapid innovation (Santosa & Yulianti, 2020).

21st-century learning has several key characteristics that distinguish it from traditional learning models, as outlined by Leuwol et al. (2023):

1. **Student-Centered Learning:** Students are at the core of the learning process, actively exploring, analyzing, and applying knowledge. Teachers act as facilitators, guiding and supporting students' learning.
2. **Collaboration and Communication:** Learning encourages students to work together in groups, discuss, and share ideas effectively to solve problems collaboratively. Social interaction is crucial for developing communication and teamwork skills.
3. **Creativity and Innovation:** Students are encouraged to think creatively, find new solutions, and innovate when addressing problems. Creativity extends beyond the arts to include "out-of-the-box" thinking and viewing issues from multiple perspectives.

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4. Technology Integration: The use of information and communication technology is integral to 21st-century learning, expanding access to learning resources and enhancing the effectiveness of the learning process.
 5. Contextual and Relevant Learning: Learning materials are connected to real-world situations and problems, enabling students to understand and apply knowledge practically.
 6. Independent and Lifelong Learning: Students are encouraged to become independent learners who continue to develop themselves throughout their lives, adapting to changing times.
 7. Interdisciplinary Learning: Integrating various disciplines to provide a holistic and comprehensive understanding (Nasir, 2023).

In 21st-century learning, the development of the 4C skills—Critical Thinking, Communication, Collaboration, and Creativity—is a primary focus, as these are considered essential for equipping students to face global challenges and the complexities of modern life (Fransisca, 2024).

Critical Thinking

Critical thinking is the ability to analyze, evaluate, and synthesize information logically and systematically to make informed decisions and solve problems effectively. It involves active mental processes that require students to question, seek evidence, assess arguments, and develop solutions based on strong reasoning (Rosnaeni, 2021). This skill is vital in 21st-century learning as it enables students to actively evaluate the validity and relevance of information in different contexts, rather than passively accepting it. Learning that emphasizes critical thinking typically uses problem-based learning or inquiry-based learning approaches to foster higher-order thinking skills (Purwati, 2022).

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Communication

Communication is the ability to convey ideas, thoughts, and information clearly and effectively, both verbally and in writing. In 21st-century learning, communication also includes active listening, providing constructive feedback, and utilizing various communication media, including digital technology (Mantau & Talango, 2023).

Collaboration

Collaboration is the ability to work effectively with others in a group to achieve common goals (Wardani, 2023). In 21st-century learning, collaboration involves effective social interaction, respecting differences, sharing responsibilities, and solving problems collectively (I. Dewi et al., 2024).

Creativity

Creativity is the ability to generate new, original, and innovative ideas to solve problems or create something valuable (Pebriana & Imami, 2024). In 21st-century learning, creativity extends beyond the arts to include flexible thinking and adaptability to change. Creative students can explore various possible solutions and are willing to try new approaches in both learning and everyday life (Ansya, 2023).

Critical Thinking

Critical thinking is a crucial cognitive skill in 21st-century learning, particularly in addressing complex challenges in the modern world (Cynthia & Sihotang, 2023). In general, critical thinking can be defined as an active and skilled mental process involving analyzing, evaluating, interpreting, and making decisions based on logically and systematically obtained information (Indiana, 2024). Critical thinking is an effort to gain a deeper and more comprehensive understanding of a topic or situation, as well as a willingness to question, analyze, evaluate, and draw conclusions from information as a basis for making informed decisions and solving problems effectively (Anggreani et al., 2025).

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In the educational context, critical thinking is not merely the ability to memorize or recall information but the capacity to think rationally and reflectively in interpreting, analyzing, evaluating, making inferences, and explaining information in depth (Kusmaryono et al., 2024). This underscores that critical thinking is a core life skill essential for developing students' mental and practical abilities, enabling them to tackle various problems effectively (Manurung et al., 2023).

Critical thinking encompasses various indicators that serve as benchmarks for an individual's ability to think critically. These indicators include the ability to focus questions, analyze arguments, ask and answer questions, evaluate information sources, observe and assess observation reports, deduce and consider deductions, induce and evaluate inductions, make and determine judgments, interpret terms, identify assumptions, decide on actions, and interact critically with others (Kurniawan et al., 2023).

Critical thinking is the ability to analyze, evaluate, and synthesize information logically and reflectively (Facione, 2011). Ennis (2011) outlines its core components:

1. Posing pertinent questions to challenge assumptions.
2. Critically assessing arguments and evidence.
3. Drawing reasoned conclusions from valid data.

Beyond distinguishing truth, critical thinking involves metacognitive awareness thinking about one's own thinking to enhance clarity and accuracy (Widiya & Radia, 2023; Nurdyyant et al., 2025). In education, it supports academic success and real-world decision-making (Kusmaryono et al., 2024). However, Indonesian students often struggle with argument evaluation due to insufficient reflective practice (Siwati & Corebima, 2021).

Flavell's (1979) metacognition theory is pivotal here. Metacognitive skills monitoring and regulating thought processes enable students to identify flaws in reasoning and adapt strategies. Yet, such training is rarely embedded in Indonesian curricula, contributing to persistent weaknesses in higher-order thinking.

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Problem Solving

Problem solving is a crucial cognitive competency in 21st-century learning, as it requires students to think critically, creatively, and systematically in addressing challenges both in school and everyday life. Generally, problem solving is defined as a mental and intellectual process used by an individual to find solutions to a problem that cannot be resolved through routine procedures or previously acquired knowledge (Angriani et al., 2020). In the educational context, problem solving is considered a significant learning outcome because it involves a series of higher-order thinking processes, from identifying the problem to evaluating the implemented solutions (Halawa & Harefa, 2024).

Problem-solving skills go beyond merely finding answers; they encompass a deep understanding of the problem, designing solution strategies, executing plans, and reflecting or evaluating the results obtained (Fitrianti, 2023). Problem solving holds a high position in the taxonomy of learning outcomes as it integrates various cognitive, affective, and psychomotor aspects of learners (Amaludin, 2022). In the learning process, the problem-solving approach encourages students to actively participate, develop initiative, and make informed decisions based on thorough analysis (Wardani, 2023).

Problem-solving entails a cognitive process to address complex or novel challenges (Polya, 1957). Jonassen (2011) delineates four stages:

1. Problem Identification: Defining the issue's core.
2. Strategy Development: Planning a resolution approach.
3. Solution Implementation: Executing the plan practically.
4. Evaluation and Reflection: Assessing outcomes and refining methods.

Problems vary from well-structured (with clear solutions) to ill-structured (requiring subjective judgment and analytical skills) (Aziyly & Rasyid, 2023). Ill-structured problems, common in real-world contexts, demand integration with critical thinking, fostering creativity and independence (Tusiaddevi & Astuti, 2021).

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In 21st-century learning, problem-solving is often embedded in PBL, which enhances collaboration and analytical abilities (Hmelo-Silver, 2004). Wardani (2023) confirms PBL's efficacy in Indonesian settings, though its success hinges on teacher expertise and resources areas where Gorontalo lags.

**Interrelationship Between 21st-Century Learning, Critical Thinking, and
Problem-Solving**

21st century learning emphasizes the integration of critical thinking and problem-solving as essential competencies, which are best nurtured through student-centered approaches that prioritize real-world relevance and active engagement (Saputra, 2024). These learning paradigms aim to move beyond rote memorization, encouraging learners to analyze, evaluate, and create knowledge through meaningful experiences. Rooted in Vygotsky's (1978) theory of social constructivism, the emphasis on collaborative learning underscores the belief that cognitive development is largely driven by social interactions. Within this framework, learners co-construct knowledge by engaging in dialogue, negotiating meaning, and working through complex problems in group-based tasks practices that mirror real-life social and professional contexts.

Alfiyah (2020) further reinforces this notion, revealing that pedagogical strategies incorporating authentic, contextually grounded tasks significantly enhance students' critical thinking and problem-solving abilities. These tasks allow learners to connect abstract concepts with practical application, thereby deepening their understanding and retention. However, the effectiveness of such approaches is not automatic. Research suggests that without proper scaffolding and structured facilitation by educators, students may resort to superficial participation, which can hinder the development of higher-order thinking skills (Kusmaryono et al., 2024). This points to the necessity of deliberate instructional design, where teachers act not merely as transmitters of knowledge but as facilitators who guide, prompt, and challenge students toward deeper learning.

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The connection between 21st-century learning and the development of critical thinking and problem-solving skills lies in its process-oriented approach. Learning no longer focuses solely on final outcomes but on how students construct knowledge through analysis, synthesis, and evaluation of information. This is supported by research indicating that students accustomed to 21st-century learning approaches show significant improvements in critical thinking skills (such as analyzing arguments and assessing information validity) and problem-solving abilities (such as designing innovative solutions) (Alfiyah, 2020).

Critical thinking serves as a prerequisite for effective problem solving. In the context of 21st-century learning, the problem-solving process requires the following abilities:

1. Accurately identifying the problem: Students must distinguish between symptoms and root causes and prioritize solutions.
2. Gathering and evaluating evidence: Students are required to select relevant information, assess the credibility of sources, and avoid cognitive biases.
3. Developing solution strategies: Students need to design systematic steps based on cause-and-effect analysis and risk-benefit considerations.

For example, in social studies learning, students trained in critical thinking can analyze the impact of economic policies on social inequality and then design data- and theory-based solutions. This demonstrates that without critical thinking, problem solving may result in superficial or unsustainable solutions (Indraswati et al., 2020).

Problem solving is a practical manifestation of critical thinking. In 21st-century learning, this process involves structured stages that integrate logic, creativity, and collaboration. For instance, when students are tasked with a project to reduce plastic waste in schools, they must:

1. Analyze the causes of the problem (e.g., lack of environmental awareness, limited recycling facilities).
2. Evaluate the environmental and social impacts of each potential solution.

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3. Implement the chosen solution (e.g., educational campaigns or establishing a recycling bank) while continuously monitoring its effectiveness.

Literature studies show that students accustomed to project-based problem solving (such as in Problem-Based Learning, PBL) not only enhance their analytical skills but also develop resilience and adaptability—essential qualities in the VUCA era (Volatility, Uncertainty, Complexity, Ambiguity) (Ngatminiati et al., 2024).

Moreover, the incorporation of technology into the learning process has shown substantial promise in amplifying the benefits of constructivist approaches. Digital tools and platforms can foster interactivity, creativity, and collaboration, creating dynamic learning environments that support diverse learner needs (Setiawan et al., 2019; Razak et al., 2021). However, the potential of technology-enhanced learning is not universally realized. For instance, in regions such as Gorontalo, limited access to technological infrastructure and digital literacy skills poses significant challenges, curbing the transformative possibilities that educational technology can offer (Sobri et al., 2020). Therefore, addressing such disparities is critical to ensuring that all students can equally benefit from innovative, student-centered learning practices in the 21st century.

Gaps in Existing Research

While global studies affirm the value of 21st-century learning, research specific to secondary education in Gorontalo is scarce. SMA Negeri 1 Gorontalo Utara's early adoption of active learning models offers a unique case, yet the impact on students' thinking skills remains underexplored. This study fills this gap by providing a detailed, context-specific analysis.

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Methodology**Research Design and Approach**

This study adopts a descriptive qualitative approach to provide a comprehensive portrayal of students' critical thinking and problem-solving abilities in 21st-century learning (Creswell & Poth, 2018). This method facilitates an in-depth exploration of classroom interactions, student behaviors, and instructional strategies through observation and document analysis.

Research Location and Duration

Conducted at SMA Negeri 1 Gorontalo Utara in May 2025, the study spanned two weeks, encompassing five 90-minute learning sessions. This duration ensured a representative sample of typical classroom activities under the school's active learning framework.

Research Subjects

The study involved 30 eleventh-grade students, selected via purposive sampling based on teacher recommendations. These students, from classes implementing PBL and collaborative learning, were deemed representative of the school's 21st-century learning efforts.

Data Collection Techniques

1. Direct Observation: Non-participatory observations focused on indicators such as questioning, logical opinion-giving, problem analysis, strategy design, and teamwork. Field notes detailed student-teacher dynamics across five sessions.
2. Documentation: Lesson plans, student worksheets, project outputs, and activity notes/photographs provided supplementary evidence, triangulating observational findings.

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Data Analysis Techniques

Analysis followed Miles et al.'s (2014) framework:

1. Data Reduction: Coding data by critical thinking (e.g., argument evaluation) and problem-solving (e.g., solution implementation) indicators.
2. Data Display: Organizing findings into tables and narratives to highlight patterns.
3. Conclusion Drawing: Interpreting trends to assess abilities and challenges.

Validity was ensured through methodological triangulation (cross-checking observation and documentation) and source triangulation (teacher confirmation). Reflective notes further enriched the analysis by capturing contextual nuances.

Findings

Observations and interviews in eleventh-grade classes revealed that students have begun to exhibit critical thinking and problem-solving skills within 21st-century learning contexts, though proficiency varies across indicators.

Critical Thinking Skills

This study aims to analyze the level of critical thinking skills of students at SMA Negeri 1 Gorontalo Utara in the subject of Computer Networking. Research data were obtained from the results of critical thinking tests using observational instruments. After obtaining the test results, the data were analyzed and categorized based on the level of critical thinking ability. The findings indicate that students with critical thinking skills at this school are also noticed by teachers, as these skills support student achievement and lead to spontaneous questioning during Informatics classes. However, students are not yet able to formulate high-quality questions in class, although they are capable of considering possible answers to questions provided.

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Observations show that the majority of students have demonstrated critical thinking skills during the learning process. The observed critical thinking indicators include:

1. Providing simple explanations related to the learning material.
2. Demonstrating the ability to draw conclusions from opinions or incoming information.
3. Evaluating ideas or opinions of classmates critically yet constructively, particularly during open discussion sessions.

Indicator	Average Score	Description
Providing Logical Opinions	3.5	Students articulate structured, rational opinions; 90% use clear explanations.
Analyzing Information	3.1	Students break down information and identify relationships effectively.
Posing Critical Questions	2.8	Students occasionally ask probing questions but rarely challenge assumptions.
Evaluating Arguments	2.7	Limited ability to assess argument validity; depth of critique is lacking.
Drawing Conclusions	2.4	Only 50% independently infer conclusions from evidence, needing more guidance.

Table 1. Critical Thinking Skills

Students with critical thinking skills at SMA Negeri 1 Gorontalo Utara exhibit strong critical thinking abilities, as observed in every classroom learning activity. It cannot be denied that the activities performed by students already reflect the characteristics of individuals with critical thinking skills. Based on the results of tabel 1. and observations, it is evident that students possess critical thinking abilities. The following are the characteristics of students with critical thinking skills:

1. Based on interviews conducted by the researcher, students are capable of providing simple explanations. Students with critical thinking skills can express their opinions using simple, clear, and easily understandable sentences. They tend to be

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cautious in their delivery to avoid errors in word choice when expressing opinions. Before communicating to others, the students verify the accuracy of the information they intend to share. This effective delivery of opinions provides evidence that the students have the ability to communicate with others. Good communication impacts the clarity of the conveyed message. When the delivery method is effective, the information transmitted automatically avoids errors or miscommunication regarding an issue. From interviews with the Informatics teacher for Grade XI, it is known that the classroom learning process sufficiently fosters the intended critical thinking skills. Interviews with the teacher indicate that 90% of the 60 students in Grades XI-A and XI-B at SMA Negeri 1 Gorontalo Utara possess the skill of providing simple explanations in Informatics classes.

2. Based on interviews conducted by the researcher, students have the ability to draw conclusions from opinions or incoming information. Students can observe and understand what is expressed by others before accepting the information. With the ability to draw conclusions from arguments, students are also capable of generating their own ideas and do not immediately agree with others' arguments. Interviews with the classroom teacher reveal that some students already demonstrate critical thinking and do not accept statements at face value. According to the data, only 50% of the 60 students in Grades XI-A and XI-B at SMA Negeri 1 Gorontalo Utara possess the skill of drawing conclusions in Informatics learning.
3. Based on interviews conducted by the researcher, students are capable of providing strategies and tactics for addressing problems. Students with critical thinking skills can offer solutions to the problems they encounter. To produce effective solutions, they weigh options, seek information from various sources, and consider the background of the issue. According to the teacher's explanation from the interviews, it can be concluded that many students engage in critical thinking activities during class and can independently answer questions posed by the teacher. Interviews with the teacher indicate that only 40% of the 60 students in Grades XI-A and XI-B at SMA Negeri 1 Gorontalo Utara possess the skill of providing strategies and tactics for problems encountered in Informatics learning.

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Organisational Studies****Problem Solving Skills**

Based on the observation conducted in Class XI of SMA Negeri 1 Gorontalo Utara, it was found that the majority of students have shown gradually developing problem-solving skills in the context of 21st-century learning. The observed learning activities involved group discussion methods, case studies, and mini-projects that enabled students to address real-world problems and seek solutions collaboratively. During this process, students appeared to be increasingly accustomed to identifying problems, formulating solution strategies, and evaluating their work outcomes.

Several indicators of problem-solving skills observed included the ability to identify issues from real-world contexts, develop logical solution plans or alternatives, implement solutions, and reflect on the process and results achieved. Throughout the learning activities, students displayed enthusiasm in expressing ideas, engaging in discussions, and proposing solutions to the problems provided by the teacher.

Indicator	Average Score	Description
Identifying Problems	3.3	Students accurately define core issues in case studies and projects.
Collaborating on Solutions	3.5	Strong group engagement; students explore diverse ideas collaboratively.
Designing Strategies	3.0	Active in planning campaigns/simulations reflecting problem understanding.
Implementing Solutions	2.8	Practical application attempted but often hindered by technical difficulties.
Evaluating Solutions	2.3	Rarely reflect on process or assess solution effectiveness; 40% independent.

Table 2. Problem Solving Skills

Note : Scores range from 1 (Very Poor) to 4 (Excellent), derived from observation and document analysis.

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The main supporting factors in this learning process were the teacher's approach, which encouraged idea exploration and collaborative learning. The teacher facilitated a learning process that emphasized active student participation. Additionally, an open classroom atmosphere also triggered student engagement in the problem-solving process. However, some challenges were observed, such as varying levels of student participation, limited face-to-face time, and a lack of habituation in conducting reflections. Students with low confidence tended to be passive and less optimally involved in discussions or group decision-making.

Discussion**Critical Thinking in Practice**

Students excel in expressing logical opinions (score: 3.5) and analyzing information (score: 3.1), reflecting Vygotsky's (1978) view that social interaction fosters cognitive growth. Group discussions and case studies provided platforms for idea articulation and perspective-sharing, aligning with Facione's (2011) critical thinking framework. Teachers noted that 90% of students consistently offered clear, rational explanations, a foundational skill for deeper analysis. However, weaker performance in evaluating arguments (score: 2.7) and drawing conclusions (score: 2.4) highlights a metacognitive gap. Flavell (1979) emphasizes that reflection assessing one's reasoning is crucial, yet students rarely critique peers' arguments in depth or infer independently. This echoes Siwati and Corebima's (2021) findings that Indonesian students lack evaluative practice, suggesting a need for explicit metacognitive instruction. Comparatively, Puling et al. (2024) found that urban students with greater resource access scored higher in argument evaluation, indicating that Gorontalo's infrastructure constraints may exacerbate this weakness. Integrating open-ended questions and peer critique could bridge this gap, encouraging deeper inquiry (Widiya & Radia, 2023).

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To assess the achievement of students' critical thinking skills in each aspect, the following will be discussed:

1. Providing Simple Explanations

In this aspect, students undergo a process of analyzing arguments by investigating reasons to understand the true situation. Critical thinkers examine their own thinking processes and those of others to determine whether their reasoning is logical. In the learning process, students are encouraged to think, read an opinion, and translate it into their own words to explain what they understand in writing in a simple manner. During this process, students demonstrate good thinking skills.

2. Drawing Conclusions

This aspect provides students with opportunities to interpret, draw conclusions, and consider the results of their judgments. Expressing interpretations is a deductive thinking process that requires good knowledge and experience. Thus, formulating a preliminary conclusion must be based on a deep understanding grounded in factual backgrounds and reliable sources. Johnson states, "Only critical thinking enables students to analyze their own thinking to ensure they have made choices and drawn intelligent conclusions." Students perform well in the sub-indicator of consequences, as it closely relates to daily life in the context of student worksheets. However, in test instruments, when it comes to sub-indicators involving factual backgrounds, interpreting, and proposing preliminary conclusions, students still need practice to become accustomed and proficient. In this phase, students perform well, though continuous practice is still necessary.

3. Strategies and Tactics

In the next aspect, students decide on an action by considering possible solutions to the issues they face. Students make decisions based on information and experiences gained from daily life interactions. As a result, students can produce excellent decisions and are fully confident in affirming a result and implementing it in action, as they have built on their knowledge and daily experiences. Frequent interactions with others also contribute to valuable experience in thinking. In this phase, students

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perform exceptionally well.

Problem-Solving Abilities

High scores in problem identification (score: 3.3) and collaboration (score: 3.5) reflect the efficacy of PBL, which mirrors Jonassen's (2011) early problem-solving stages. Students adeptly formulated issues and collaborated on solutions, leveraging diverse viewpoints a strength noted by teachers during mini-projects. Wardani (2023) similarly observed that PBL enhances teamwork, though its full potential requires robust facilitation. Conversely, lower scores in implementation (score: 2.8) and evaluation (score: 2.3) indicate challenges in later stages. Students struggled to apply plans practically and seldom reflected on outcomes, with only 40% proposing independent strategies typically those active in discussions and source-verification. This aligns with Hmelo-Silver's (2004) assertion that PBL demands strong scaffolding, often absent due to time and resource limitations in Gorontalo. Compared to Tusiaddevi and Astuti's (2021) study, where structured problem-solving steps improved outcomes, SMA Negeri 1's students need more guided practice in execution and reflection. Local-context PBL (e.g., addressing Gorontalo's environmental issues) could enhance relevance and skill application.

To assess the achievement of students' problem-solving skills in each aspect, the following will be discussed:

1. Problem Identification

Students' initial problem-solving ability is demonstrated through the process of identifying problems. In several case study-based learning activities, students were able to clearly articulate the core of the issue, such as topics related to environmental issues, poverty, or social inequality. They could distinguish between symptoms and root causes, showing early signs of analytical thinking skills. This aligns with Dewi's (2024) theory that problem identification is the foundational step for effective problem-solving.

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2. Designing Solutions

At this stage, students actively participated in group work to design various alternative solutions. They engaged in brainstorming ideas and then selected the most realistic and applicable solutions. For example, in one activity, students designed an environmental awareness campaign to reduce plastic waste in schools. This process reflects creative and collaborative thinking efforts, as noted by Rosfiani et al. (2025), that students trained in problem-solving tend to demonstrate better exploration and synthesis abilities.

3. Implementing Solutions

Several student groups were able to implement their planned solutions in the form of small projects, such as presentations, campaigns, or policy simulations. The implementation was carried out with enthusiasm and demonstrated good collaboration among students. Despite technical obstacles and varying individual abilities, students generally succeeded in applying their ideas in real-world contexts.

4. Evaluation and Reflection

This stage remains an aspect that needs improvement. Only some students actively evaluated the success of the solutions they implemented. Several students seemed unaccustomed to systematically assessing the effectiveness of their actions. However, according to Nuarta (2020), the evaluation process is a crucial step in enhancing critical awareness and improving problem-solving strategies.

Challenges in Skill Development

These challenges mirror broader Indonesian trends, where traditional assessments prioritize completion over process (World Bank, 2020). Inquiry-based learning and formative feedback could mitigate this, fostering reflection and resilience (Black & William, 1998).

1. **Limited Reflective Practice:** Students' unfamiliarity with self-assessment hampers metacognitive growth, a common issue in Indonesian education (Razak et al., 2021).

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2. Infrastructure Deficits: Lack of interactive tools restricts creative exploration, contrasting with tech-rich settings (Setiawan et al., 2019).
 3. Time Constraints: Ninety-minute sessions limit in-depth analysis, a structural barrier noted by Indraswati et al. (2020).

Theoretical and Practical Implications

Theoretically, this study reinforces that 21st-century learning boosts critical thinking and problem-solving but requires metacognitive focus. Vygotsky's (1978) and Flavell's (1979) frameworks highlight the interplay of collaboration and reflection, underdeveloped here. Practically, it suggests:

1. Teacher Training: Enhancing facilitation skills for PBL and reflective strategies.
2. Curriculum Design: Embedding local issues to make learning authentic.
3. Policy Support: Investing in technology and extending class time.g

Compared to urban studies (e.g., Alfiyah, 2020), Gorontalo's context demands tailored interventions, balancing resource constraints with innovative pedagogy.

Conclusions

Based on the observations and interviews conducted in Class XI of SMA Negeri 1 Gorontalo Utara, it can be concluded that students' critical thinking and problem-solving skills have begun to develop with the implementation of 21st-century learning approaches. These findings directly address the research objective, which is to describe students' critical thinking and problem-solving abilities. Students' critical thinking skills fall within the moderate to good category, with strengths in providing logical opinions and analyzing information. Meanwhile, their problem-solving skills are more prominent in problem identification and collaboration but remain weak in solution evaluation.

Overall, the learning process at SMA Negeri 1 Gorontalo Utara has supported the development of critical thinking and problem-solving skills, although improvements in strategies are still needed to ensure more equitable student participation and abilities. The intensified use of problem-based learning approaches, reflection, and

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collaborative facilitation can be key to strengthening these competencies. Based on the conclusion above, the following recommendations are provided by the researcher:

1. For Teachers: It is recommended to continue developing learning models that actively engage students, such as problem-based learning and project-based learning. Teachers should also provide open-ended and reflective prompts to encourage students' courage in critical thinking and expressing opinions.
2. For Schools: Schools are expected to provide training or workshops for teachers to enhance their pedagogical competence in fostering students' critical thinking and problem-solving skills. Support for facilities, such as interactive learning media and discussion spaces, should also be improved.
3. For Future Researchers: This research can be continued by focusing on additional variables, such as the role of teachers, the learning environment, or the use of learning technology in developing 21st-century skills.

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