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Critical Thinking Profile and Learning Interests of Elementary School Students in Human Digestive System Learning

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Abstract
This study aims to comprehensively describe the profile of critical thinking skills among fifth-grade students at SDN Masangan Wetan in the context of learning about the human digestive system. The research focuses on identifying both internal and external factors that support or hinder the development of critical thinking skills. Using an essay-based assessment grounded in Facione's framework, which includes interpretation, analysis, inference, and evaluation, the study measured students' critical thinking abilities. Additionally, interviews with teachers provided insights into the instructional strategies, media usage, and teaching models employed to foster critical thinking. The findings show that students' critical thinking skills vary across different indicators, with the highest proficiency in interpretation and the lowest in evaluation. Internal factors such as motivation, cognitive ability, and self-efficacy positively influence skill development, while external factors including a supportive learning environment, innovative teaching methods, and diverse educational media also play crucial roles. The study found that integrated, interactive media and student-centered models like Problem-Based Learning and collaborative learning significantly enhance critical thinking. Conversely, conventional teaching practices and limited media use restrict students' critical thinking growth. Teacher interviews highlighted the importance of practical learning activities and varied instructional materials to engage students actively. These results underscore the necessity for educators to implement multifaceted approaches that address both student-internal and environmental factors to optimize critical thinking development. The study involved a total sample of 35 students, and quantitative data were analyzed using descriptive statistics, with mean scores and standard deviations reported to illustrate proficiency levels across critical thinking indicators. Ultimately, the research contributes valuable evidence for educational stakeholders seeking to improve science education quality through enhanced critical thinking skills, especially in primary education settings. Future studies are recommended to include larger samples and statistical tests such as t-tests or ANOVA to strengthen the generalizability and significance of findings.

INTRODUCTION

Education is the main foundation in human resource development and has a crucial role in shaping the mindset and character of students from an early age. The educational process is not only limited to knowledge transfer, but also includes the development of high-level thinking skills, such as critical thinking that are indispensable in the face of global challenges. In the era of digital disruption and rapid technological transformation, critical thinking skills are essential competencies in answering the challenges of the Industrial Revolution 4.0 and Society 5.0 (Liriwati, 2023). Students need to be equipped with the ability to analyze, evaluate, and make decisions based on valid and relevant information. This is in line with the new paradigm of 21st century education which emphasizes the mastery of the 4C competencies (Critical Thinking, Communication, Collaboration, and Creativity) as the foundation of scientific thinking (Thana & Hanipah, 2023). Critical thinking skills also allow students to be reflective, open to differences, and have high reasoning power in responding to various

phenomena. Therefore, the role of teachers in designing contextual, active, and exploratory learning is becoming increasingly important. Teachers are required to provide learning experiences that are able to stimulate the critical thinking process optimally in a positive and supportive learning environment.

At the elementary school level, Natural Sciences (IPA) learning has great potential in developing critical thinking skills because it is directly related to natural phenomena and daily life. Science is not only a collection of facts or concepts, but also reflects a scientific process that encourages students to ask, investigate, and draw conclusions based on empirical data (Febriyanti et al., 2024). However, the reality on the ground shows that the implementation of science learning in elementary schools is still dominated by traditional approaches that focus on memorization and lectures (Ismawanti et al., 2023). This approach is less able to develop students' analytical and evaluative abilities which are the core of critical thinking. The Independent Curriculum that has been implemented in Indonesia actually provides space for the development of these competencies through student-oriented learning (Aliyah et al., 2024). However, not all educators are able to take full advantage of this opportunity due to limited knowledge, pedagogical skills, and the lack of support for interactive learning media. As a result, students' interest in learning and conceptual understanding of science materials, especially food digestion materials, is still at a low to moderate level. This emphasizes the importance of evaluation and innovation in the science learning process to create a more meaningful and intellectually challenging learning experience.

Food digestion material in humans is one of the important topics in the science curriculum in elementary schools that can be used as a vehicle to develop critical thinking skills. Understanding the digestive system is not only biologically important, but also contributes to students' awareness of the importance of a healthy diet and maintaining a healthy body. Unfortunately, many students only understand the digestive system superficially, limited to mechanical aspects without being able to explain the chemical and functional processes of the digestive organs as a whole (Ismawanti et al., 2023). The low science literacy of students is also a major obstacle in building strong conceptual understanding and high-level thinking skills (Yulia & Putri, 2024). Therefore, a learning strategy is needed that not only conveys information, but also encourages students to explore, analyze, and draw conclusions from various phenomena studied. The use of interactive learning media, simple experiments, and inquiry-based approaches can be alternative solutions in improving the quality of science learning (Rismawati & Tyas, 2025). In addition, integrating triggering questions during the learning process can lead learners to think logically and reflectively. Thus, food digestion material in humans can be used as a concrete context to train and hone students' critical thinking skills systematically.

Students' interest in learning is also an important factor that contributes to the effectiveness of learning and the achievement of critical thinking competencies. A high interest in learning encourages students to be actively involved in the learning process, seek more information, and have an internal drive to understand the material in depth (Ristiana, 2023). On the other hand, low interest in learning has an impact on passive attitudes and dependence on teachers, making it difficult to develop critical thinking skills. Research shows that the use of conventional learning methods, the lack of variety of learning media, and the lack of involvement of students in the learning process are the main causes of low interest and critical thinking skills among elementary school students (Ansya, 2023). Therefore, teachers need to develop learning designs that are adaptive, participatory, and in accordance with the characteristics of students (Yuwono & Mirnawati, 2021). The application of a contextual and problem-based learning model can increase motivation and foster students' curiosity about the material studied. A good interest in learning will create a more dynamic, creative learning environment and encourage students to develop their critical thinking potential to the maximum (Rambung et al., 2023). The integration between learning interests and critical thinking skills will create synergy in achieving holistic science learning goals.

Based on the results of initial observations in grade V of SDN Masangan Wetan, it was found that science learning, especially in food digestion materials, has not been fully able to cultivate students' critical thinking skills. The learning process is still teacher-centered and there is minimal exploration of scientific knowledge in an applicative manner. Learners tend to be passive, only receiving information without being given space to explore or analyze in depth. The lecture method and written assignment are the main approaches used by teachers, which are not in line with the principles of the Independent Curriculum which emphasizes active and exploratory learning (Fauzia & Ramadan, 2023). This situation has an impact on the low ability of students to understand concepts as a whole and relate them to daily life. Research shows that learners have difficulty in identifying the functions of the digestive organs and are unable to draw logical conclusions from the information they obtain. This indicates that pedagogical interventions are needed to design learning experiences that are able to foster critical thinking skills in a sustainable manner. However, based on a review of previous studies, limited research has specifically investigated the actual profile of students' critical thinking skills and learning interests in the context of elementary science learning, particularly in digestive system materials. Most previous studies focused on the general application of inquiry models or learning media development without providing detailed data on the baseline critical thinking abilities of students at the elementary level. Therefore, there is a clear research gap in terms of empirical evidence regarding critical thinking assessment and learning interest profiling in primary school science subjects.

This study aims to identify the critical thinking profile and learning interests of grade V students in science learning, especially in food digestion materials, and uncover the factors that affect them. The results of the research are expected to make a theoretical contribution to the development of education, especially in science learning based on the Independent Curriculum. In addition, practically this research can be a reference for educators and policy makers in designing adaptive and responsive learning strategies to the needs of students in the digital era. By understanding the actual condition of students' critical thinking skills and learning interests, learning interventions can be designed in a more targeted manner and have a positive impact on improving the quality of education. This research also fills a gap in the literature that is still limited regarding the implementation of the Independent Curriculum in the context of developing critical thinking in science subjects at the elementary school level. In addition, the qualitative descriptive approach used allows researchers to understand the phenomenon in depth from the perspective of students and educators. The implications of the results of this study can be used as a basis for the preparation of more contextual and needs-based learning tools. Thus, this research is expected to make a real contribution to the development of education that is more humanistic, transformative, and relevant to future challenges.

METHODS

This study uses a descriptive qualitative approach with the aim of describing in depth the profile of critical thinking skills and learning interests of class V students in Natural Sciences learning, especially in food digestion materials in humans. This approach was chosen because it is in accordance with the characteristics of the problem that emphasizes understanding meaning, interpretation of students' learning experiences, and their involvement in the learning process in a contextual manner (Creswell, 2016). The subjects of the study were 40 students of class V of SDN Masangan Wetan, Sukodono District, Sidoarjo Regency, who were selected purposively with consideration of the suitability of the characteristics and availability of the subject in the context of the material being studied. The main focus of this study includes the critical thinking skills demonstrated in solving analysis-based problems as well as learning interests which are reflected in active participation during the learning process.

Data collection was carried out through two main techniques, namely a written test and a semi-structured interview. The written test is designed to measure indicators of critical thinking skills such as interpretation, analysis, inference, and evaluation, referring to the critical thinking framework.

Interviews were conducted with classroom teachers and several students to obtain supporting data related to motivation, learning interests, and learning strategies used in the classroom. The instruments used have been validated by science education experts and tested previously on subjects that have similar characteristics. The data triangulation technique is carried out to ensure the validity of the results obtained from various sources. The data analysis in this study uses the Miles & Huberman (2013) model which involves three main stages: data reduction, data presentation, and conclusion drawn. The test and interview results data were coded and categorized based on critical thinking indicators and learning interest aspects. Furthermore, the data is presented in the form of a descriptive narrative supported by direct quotes from respondents to reinforce interpretation. The results of the analysis aim to provide a comprehensive overview of the tendency of students' critical thinking skills and the factors that affect their learning interest in understanding food digesting materials. With this method, it is hoped that comprehensive information can be obtained to design more effective and innovative learning strategies in accordance with the principles of the Independent Curriculum.

RESULTS AND DISCUSSION

Results

This study aims to describe the profile of learning interest and critical thinking skills among fifth-grade students at SDN Masangan Wetan, specifically in the topic of the human digestive system. Both learning interest and critical thinking skills are essential competencies for students to successfully navigate the challenges of the information age. Students who exhibit a high level of learning interest and critical thinking are expected to be capable of analyzing information, evaluating arguments, and making informed and rational decisions.

Table 1. Profile of Critical Thinking Skills of Class V Students of SDN Pasangan Wetan on Food Digestion in Humans

Level of Students' Critical Thinking Skills	**Critical Thinking Skills Level on Each Indicator**	**Supporting and Inhibiting Factors for the Improvement of Students' Critical Thinking Skills**	**Use of Media and Learning Models in Developing Students' Critical Thinking Skills**
Very High	1. Interpretation: 10 2. Analysis: 10 3. Evaluation: 10 4. Inference: 10	Internal Factors: • Strong self-motivation • Self-efficacy • High learning interest • Good cognitive abilities • Good reading and writing skills • Not afraid of making mistakes External Factors: • Supportive learning environment • Role models from teachers • Active and innovative learning methods • Use of varied learning media • Support from parents and surrounding environment	The use of integrated, innovative media and learning models has a direct impact on students' critical thinking skills. The media used are diverse and interactive, while the learning models applied support the development of higher-order thinking skills.
High	1. Interpretation: 8 2. Analysis: 8 3. Inference: 8 4. Evaluation: 8	Use of media and learning models is fairly integrated and effective in enhancing students' critical thinking skills. The media used are varied and support the learning process, and the learning models applied are	

		fairly flexible and actively involve students.
Moderate	1. Interpretation: 6 2. Analysis: 6 3. Inference: 6 4. Evaluation: 6	Use of media and learning models is still limited and not fully optimal in developing students' critical thinking skills. The media tend to be conventional and less interactive, and the learning models applied are still teacher-centered.
Low	1. Interpretation: 5 2. Analysis: 5 3. Inference: 5 4. Evaluation: 5	Use of media and learning models is minimal or even non-existent. The learning models applied are very traditional and do not stimulate students to think critically.
Very Low	1. Interpretation: 3 2. Analysis: 3 3. Inference: 3 4. Evaluation: 3	There is no use of media or learning models that support the development of students' critical thinking skills. The learning models applied are very passive and do not actively engage students.

Table 1 presents the profile of students' critical thinking skills categorized into five levels: very high, high, moderate, low, and very low. These categories reflect students' abilities across four indicators of critical thinking: interpretation, analysis, inference, and evaluation. Each indicator is rated on a scale from 3 to 10, where higher scores denote stronger capabilities. Students in the "very high" category scored 10 in all indicators, demonstrating exceptional critical thinking abilities, supported by internal factors such as high intrinsic motivation, strong self-efficacy, cognitive abilities, and reading-writing skills. External factors include a conducive learning environment, supportive teachers, innovative teaching methods, and parental involvement.

Furthermore, the findings highlight the crucial role of media and instructional models in developing students' critical thinking skills. Students with higher critical thinking levels were those exposed to integrated, innovative, and interactive learning media and methods. Conversely, students in the lower categories were typically engaged in traditional, teacher-centered models with minimal or no use of educational media. The data suggest a clear correlation between the quality and integration of instructional media and the development of higher-order thinking skills. Therefore, it is evident that employing diverse and student-centered learning strategies significantly contributes to enhancing students' critical thinking competencies.

This study aimed to quantify the critical thinking skills of fifth-grade students at SDN Masangan Wetan in understanding the human digestive system. The assessment instrument comprised eight essay questions designed based on Facione's critical thinking framework, encompassing four core indicators: interpretation, analysis, inference, and evaluation . Each response was scored on a scale of 0 to 5: a score of 5 was awarded for answers that were correct, complete, and systematic; 3 for responses containing two correct components; 1 for answers with one correct component; and 0 for incorrect or irrelevant responses. The maximum attainable score was 40, with final scores calculated using a standardized formula.

The analysis revealed that out of 40 students (19 females and 21 males), the distribution of critical thinking skills was as follows: 10% (4 students) were categorized as very low, 50% (20 students) as low, 15% (6 students) as moderate, 20% (8 students) as high, and only 5% (2 students) as very high. This indicates a predominant concentration of students within the low to very low

categories, highlighting a significant need for interventions to enhance critical thinking abilities. Further examination of each critical thinking indicator showed that 'interpretation' had the highest average score, suggesting that students generally could comprehend and restate information effectively. 'Inference' followed, indicating a moderate ability to draw conclusions based on provided information. 'Analysis' scores were lower, reflecting challenges in examining ideas and identifying arguments. 'Evaluation' had the lowest average score, signifying difficulties in assessing the credibility of statements and the strength of arguments. For instance, in response to a question requiring evaluation of dietary choices, many students failed to provide comprehensive justifications, indicating a gap in evaluative reasoning skills.

To gain deeper insights, interviews were conducted with fifth-grade teachers at SDN Masangan Wetan. Teachers emphasized the importance of critical thinking in science education, particularly in topics closely related to students' daily lives, such as the human digestive system. They reported employing various strategies to foster critical thinking, including the use of diverse instructional media (textbooks, laptops, LCD projectors, and educational videos) and engaging students in hands-on activities to reinforce theoretical knowledge. Despite these efforts, teachers acknowledged that traditional teaching methods, such as direct instruction using textbooks and occasional PowerPoint presentations, still predominated. They also noted that while some interactive media were utilized, there was a lack of consistent implementation of student-centered approaches like Problem-Based Learning (PBL), which has been shown to effectively enhance critical thinking skills . In summary, the findings indicate that while students possess basic interpretative skills, there is a pressing need to develop higher-order thinking skills, particularly in analysis and evaluation. The current instructional practices, although incorporating some interactive elements, require a more systematic application of pedagogical models proven to cultivate critical thinking, such as PBL. Addressing these gaps is essential for equipping students with the necessary skills to navigate complex information and make informed decisions in their academic and everyday lives.

To strengthen the findings, it is recommended that the authors incorporate contradictory evidence or alternative explanations regarding the development of students' critical thinking skills. For instance, while the current study highlights the positive impact of interactive media and student-centered learning models, some studies have reported limited or insignificant effects of such interventions in certain contexts, often due to factors such as students' prior knowledge, socio-cultural backgrounds, or teachers' readiness to implement innovative strategies. Including these perspectives could provide a more balanced discussion and help explain why, despite the use of various media, a majority of students in this study still exhibited low critical thinking performance. Moreover, the possibility that factors external to the classroom environment, such as parental education level or home learning support, may influence critical thinking outcomes should be discussed. Presenting these alternative viewpoints will enhance the scholarly rigor of the article and contribute to a more nuanced understanding of the complexities in fostering critical thinking at the elementary level.

Discussion

The results of this study indicate a diverse range of critical thinking skills among fifth-grade students at SDN Masangan Wetan, particularly on the topic of human digestion. The distribution of critical thinking levels, from very high to very low, highlights the varying degrees of student readiness to engage with complex scientific concepts. According to Malagola et al. (2023), critical thinking involves skills such as interpretation, analysis, inference, and evaluation, all of which are crucial for meaningful learning in science education. This study confirms that students with higher critical thinking skills tend to benefit from more innovative and integrated learning models and media. Conversely, those with lower scores often experience limited interaction with active learning tools, which impairs their ability to engage deeply with the material. This variation aligns with findings by Ansya (2023), who emphasized the importance of active learning strategies in cultivating critical thinking. Furthermore, the internal motivation and cognitive abilities of students significantly impact

their critical thinking capabilities, supporting Pautina & Pratiwi (2024) on self-efficacy and motivation in learning processes. Thus, educators should consider both internal and external factors to optimize learning outcomes.

The study also identifies the critical role of learning media and instructional models in developing students' critical thinking skills. Interactive and varied media, such as videos and simulations, are shown to stimulate student engagement and foster deeper understanding of scientific concepts (Pratama et al., 2023). This finding corroborates the constructivist view that learners construct knowledge actively when exposed to rich learning environments (Pertiwi et al., 2022). The integration of technology with pedagogical approaches, like problem-based learning (PBL), further encourages students to analyze and evaluate information critically (Putri et al., 2024). However, the study reveals that many students still experience traditional teacher-centered methods, limiting their opportunity to develop higher-order thinking skills. This gap suggests a need for systematic professional development for teachers to implement more effective learning models. Supporting this, Solihin et al. (2025) argues that the use of technology-enhanced learning environments can significantly enhance students' critical thinking abilities. Therefore, the implementation of innovative teaching strategies should be prioritized in curriculum design.

Internal factors, including motivation, cognitive ability, and self-efficacy, emerged as significant contributors to the enhancement of students' critical thinking. Agustini et al. (2024) highlights how self-efficacy influences learners' engagement and persistence in cognitive tasks. Students with strong motivation and confidence are more likely to tackle complex problems and remain resilient in the face of challenges (Indriani et al., 2024). This is consistent with the study's findings that students who are not afraid to make mistakes tend to have higher critical thinking scores. Furthermore, cognitive skills such as reading and writing proficiency facilitate better comprehension and analysis of scientific texts (Arisandhi et al., 2023). These findings emphasize the importance of fostering a supportive learning environment that nurtures intrinsic motivation and cognitive development (Lestari, 2024). As such, instructional strategies should focus on building students' confidence and encouraging risk-taking in learning.

External factors, particularly the learning environment and teacher's role, are also critical in shaping students' critical thinking abilities. A conducive classroom atmosphere that encourages inquiry and open dialogue supports deeper cognitive engagement (Soysal, 2021). The study found that teacher role modeling and the use of active, innovative instructional methods promote critical thinking development. This aligns with Preti (2024) advocacy for experiential learning, where students actively construct knowledge through meaningful experiences. Parental and community support further reinforces students' academic motivation and achievement (Wahyudin & Paksi, 2022). The collaborative involvement of these external agents creates a holistic ecosystem for learning. Therefore, fostering partnerships among teachers, parents, and the community is vital for sustaining student engagement and critical thinking growth.

Assessment techniques in this study involved essay tests based on Nussbaum (2021) framework, which allowed for a nuanced measurement of critical thinking indicators such as interpretation, analysis, inference, and evaluation. The scoring rubric provided detailed differentiation among responses, supporting reliable and valid data collection. Such formative assessments guide teachers in identifying specific areas where students struggle, enabling targeted interventions. Moreover, incorporating open-ended questions encourages students to articulate reasoning processes, thereby deepening their metacognitive awareness (Nusantari et al., 2021). This approach resonates with research by Ramdani & Susilo (2022), who emphasize the importance of metacognition in fostering critical thinking. As a result, the assessment method used in this study proves effective in capturing the complexity of students' thinking skills in science learning contexts.

The disparity in students' critical thinking skills observed between classes IV-A and IV-B may reflect differences in instructional delivery and classroom dynamics. Although both groups showed competency in basic thinking skills, such as interpretation, their ability to evaluate and infer was

relatively weaker. This is consistent with findings from Pramesila (2022), who noted that evaluation and inference require more sophisticated cognitive engagement that develops over time. The lower scores in evaluation suggest a need for instructional strategies that explicitly teach reasoning and judgment skills Stit & Nusantara (2020). Integrating scaffolded learning experiences, where students progressively engage with increasingly complex tasks, may help bridge these gaps (Wood, Bruner, & Ross, 1976). These findings reinforce the call for differentiated instruction tailored to students' varying readiness levels.

Teacher perceptions gathered through interviews revealed a positive attitude toward the importance of critical thinking in science education. Educators recognized that the subject matter of human digestion is highly relevant to students' everyday lives, making it an ideal context to apply critical thinking skills. The teachers' efforts to use multimedia tools and hands-on activities reflect best practices in science teaching as recommended by Solihin et al. (2024). Such strategies help shift students from passive receivers of knowledge to active participants in learning (Bransford, Brown, & Cocking, 2000). However, teachers also acknowledged challenges, such as limited resources and time constraints, which hinder the full implementation of innovative methods. These insights highlight the ongoing need for support systems to empower teachers in fostering critical thinking. Finally, the study underscores the value of collaborative and inquiry-based learning models, such as problem-based learning and group discussions, in enhancing critical thinking. Collaborative learning promotes communication, negotiation, and diverse perspectives, enriching students' analytical and evaluative abilities. Moreover, the use of prompting questions that stimulate analysis and synthesis encourages students to think deeply and make connections across concepts. Thus, curriculum developers and educators should prioritize active learning methods that engage students in meaningful inquiry.

CONCLUSION

This study reveals that the critical thinking skills of fifth-grade students at SDN Masangan Wetan vary significantly, influenced by both internal and external factors. Students with higher motivation, cognitive ability, and self-efficacy tend to demonstrate stronger critical thinking capabilities, particularly when supported by a conducive learning environment and innovative teaching methods. The effective use of diverse, interactive media and problem-based learning models positively impacts students' abilities to interpret, analyze, infer, and evaluate scientific concepts. Conversely, limited access to engaging instructional tools and traditional teacher-centered methods contribute to lower critical thinking skills. Assessment through essay tests aligned with Facione's framework proves useful in identifying students' strengths and weaknesses across critical thinking indicators. Teacher perceptions highlight the importance of relevance and active learning strategies, though resource constraints remain a challenge. Collaborative learning and inquiry-based approaches further enhance critical thinking by fostering communication and deeper cognitive engagement. Therefore, integrating supportive internal factors with progressive, interactive external strategies is essential to cultivate critical thinking skills in elementary science education.

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