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STRENGTHENING CRITICAL THINKING THROUGH AN INQUIRY-BASED APPROACH TO LEARNING IN THE FIELD OF SUSTAINABLE DEVELOPMENT

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Purpose: The aim is to present how an inquiry-based learning approach can enhance critical thinking in the context of sustainable development education, while also offering practical guidelines for teachers and educational institutions.
Approach: This article will discuss how an inquiry-based approach to sustainable development education can foster critical thinking in students, preparing them to face the complex challenges of the modern world.
Findings: The inquiry-based approach to teaching sustainable development significantly supports the development of critical thinking in students. Learners, instead of passively absorbing information, are actively engaged in problem-solving, which improves their analytical skills and ability to evaluate complex environmental and social issues.
Practical implications: Critical thinking allows for a more conscious and well-considered approach to environmental and social actions, which may lead to better alignment of strategies with actual needs and greater effectiveness of the initiatives undertaken. This, in turn, increases the efficiency of efforts towards sustainable development. The article points to the need for introducing new teaching methods in schools and universities, which place greater emphasis on critical thinking and inquiry-based approaches to solving sustainability-related problems. It also highlights a holistic approach to changing educational directions.
Originality/value: While critical thinking is widely studied, this approach has not been specifically applied in the context of sustainable development. The analysis of available data shows that critical thinking helps better analyze and solve issues related to climate change, resource management, and social justice.
Keywords: sustainable development, critical thinking, inquiry-based.
Category of the paper: Viewpoint, general review.

1. Introduction

In the face of global environmental, social, and economic challenges, sustainable development has become a key goal for modern societies. In this context, educating individuals capable of critical analysis, problem-solving, and making informed decisions is of exceptional importance. Strengthening critical thinking, particularly through an inquiry-based approach to learning, becomes not only a tool for effective teaching but also a foundation for responsible action towards a sustainable future.

Main educational strategies should aim to develop social awareness among students. Political changes, technological solutions, and financial measures alone are insufficient to meet the demands placed on education for sustainable development (Konieczny, 2023b, p. 243). The role of education is to create conditions for developing all aspects of critical thinking to prepare students for life in a dynamically evolving society across all fields of action: economic, ecological, and social.

2. Education for sustainable development

Education for Sustainable Development (ESD) is a broad concept that extends beyond the boundaries of environmental education. In addition to environmental issues, it encompasses social topics such as human rights, multiculturalism, health, and its economic aspects. It is based not only on conveying knowledge but also on fostering creative and critical thinking, and stimulating problem-based learning. Sustainable development is a concept that seeks to harmoniously balance the needs of the present generations with those of future generations, so that socio-economic development occurs without degrading the natural environment and without excluding any social groups. It includes three key dimensions: economic, social, and ecological.

An interdisciplinary approach to teaching sustainable development is necessary because the challenges associated with it are complex and permeate various aspects of life. Issues such as climate change, social inequalities, and natural resource management require collaboration between different disciplines—from natural sciences to economics to social sciences. This approach enables a better understanding of the connections between various aspects of sustainable development and the creation of more effective and integrated solutions. It provides the opportunity to make informed decisions and undertake individual and collective actions to transform society and care for the planet. ESD is a lifelong learning process and an integral part of high-quality teaching, developing cognitive, socio-emotional, and behavioral aspects of learning, including content, learning outcomes, methodology, and the learning environment

itself (UNESCO, 2024). It involves lifelong learning and is an essential component of high-quality education. ESD is holistic and transformative education that encompasses teaching content and outcomes, pedagogy, and the learning environment. It achieves its goal through the transformation of society (UNESCO, 2014, p. 12).

3. Critical thinking

Thinking is required for puzzles, life problems, and daily situations. It helps us find solutions and allows us to transform our mental representations of the world (Nęcka et al., 2006, p. 421). According to psychologists such as R. Sternberg (1999), E. Nęcka (2006), and T. Maruszewski (1996), critical thinking is considered a form of realistic thinking. Its goals include a thorough and realistic assessment of significant aspects of human intellectual activity, as well as enhancing the chances of obtaining results that meet specific criteria. It is connected to creative thinking, as striving to achieve goals according to required criteria allows for the development of conclusions that improve a given definition, subject, or activity (Nęcka et al., 2006, p. 429). Critical thinking also helps to clarify questions or problems, evaluate the truthfulness of evidence, and develop criteria for assessing others' work. A critical thinker is someone who seeks the truth. They do not accept it as given but constantly question everything at all times. They are ready to challenge others' ideas and concepts.

Critical thinking is not about choosing one, always the same, strategy for action. It involves being aware of one's limitations, intellectual humility, and collaboration with experts in the field (Uribe-Enciso et al., 2017, p. 81). It is a skill that must be continually developed; acquiring it without proper stimulation is not a guarantee of success. If a teacher wants to develop this ability in their students, they must encourage them to question their ideas and reasoning. The result of this thinking, which is not easily achieved, will be the willingness of students to critically examine the outcomes and processes of their own thinking. A student who understands that everyone can make mistakes and that others' thinking can also be flawed will more easily accept that they do not always have to be right and will learn to respect others' opinions. Critical thinking should help them better understand the world and themselves. However, it will not be successfully integrated into daily activities if it is just another "systemic" requirement for teachers. A holistic change in thinking about education and its impacts is crucial.

4. The Importance of Critical Thinking in the Context of Sustainable Development

UNESCO has prepared the *Draft Revised 1974 Recommendation Concerning Education for International Understanding, Cooperation, and Peace and Education Relating to Human Rights and Fundamental Freedoms*, which indicates that "education should be transformative, building solid foundations in literacy and numeracy, and enabling the development of knowledge, skills, values, attitudes, and behaviors, such as: analytical and critical thinking; the ability to question norms, practices, and opinions; critical analysis and understanding of complex systems and multicultural environments; as well as understanding the dynamics of power and the interconnections between countries, populations, and the natural environment, as well as between local, national, regional, and global levels" (UNESCO, 2023, p. 6).

The challenges associated with sustainable development are extremely complex and multidimensional, as they touch on various aspects of social, economic, and ecological life, and require a holistic approach that considers the interconnections between these spheres. It is worth noting three main areas:

- Climate Change: One of the most urgent and global issues of sustainable development.
- Biodiversity Conservation: Crucial for ecosystem health, but also highly complex. Biodiversity protection often requires limitations on the use of natural resources, which can lead to conflicts with local communities that depend on these resources. Finding a balance between protecting nature and meeting human needs is a challenging task.
- Social Justice: A fundamental aspect of sustainable development. Globalization often transfers social problems from one region to another. For example, cheap production in developing countries often comes at the expense of working conditions and the environment, raising questions about global justice.

All these areas are strongly interconnected. For instance, climate change can exacerbate social inequalities as the poorest communities are often the most vulnerable to its effects. Meanwhile, biodiversity conservation can support the development of local communities by providing access to natural resources but may also require restrictions that could be perceived as unfair. Issues related to sustainable development therefore require a multidimensional approach that integrates environmental protection, economic development, and social justice. Only such an approach can lead to sustainable solutions.

An effective approach to solving problems related to sustainable development requires skills in critical analysis, evaluation, and informed decision-making. These competencies are crucial because these problems are complex, interrelated, and often lack simple solutions. It is important to consider their correlation:

- Critical Analysis: Involves a deep understanding of problems, their causes, and consequences. In the context of sustainable development, this means that complex issues such as climate change, biodiversity conservation, and social justice are closely interconnected. Critical analysis allows understanding how actions in one area impact others, which is key to avoiding unintended consequences. Decisions must be based on reliable data and scientific research. Critical analysis enables the evaluation of source credibility, understanding trends, and predicting future scenarios. There is rarely a single ideal solution in sustainable development. Critical analysis allows for the consideration of various options and understanding their pros and cons, which is essential for making optimal decisions.
- Evaluation: A systematic process of considering all aspects of a problem or decision and its consequences, both short-term and long-term. Effective evaluation allows predicting potential impacts, such as effects on the environment, society, or economies. In sustainable development, risk cannot be avoided but can be managed. The ability to evaluate risk allows for identifying potential threats and developing strategies to mitigate them. Decisions regarding sustainable development often involve choosing between different values, such as environmental protection versus economic development. Evaluating these values in an ethical and social context is crucial for making decisions that will be accepted by society.
- Informed Decision-Making: Based on recognizing consequences, relying on reliable information, and ethical values. It includes ecological, social, and economic aspects. This requires the ability to think systemically and holistically. Decisions in sustainable development must consider diverse perspectives, including the interests of local communities, industries, future generations, and ecosystems. Informed decision-making is the skill of balancing these interests. Decisions should be flexible and adaptive, as situations and data may change. This means being ready to modify strategies in response to new information or changing conditions.

Critical analysis, evaluation, and informed decision-making are fundamental skills in effectively addressing sustainable development issues. They allow for thorough analysis of problems, understanding their multidimensional impacts, and making decisions that are thoughtful, fair, and balanced. Only such an approach allows for developing effective strategies that can address global challenges related to environmental protection, biodiversity, and social justice. In addressing critical thinking competencies in education, it is not enough to change teaching methods and introduce special programs for developing critical thinking into the existing system, as it requires questioning, deconstructing, and reconstructing the status, role, and power of students and teachers in the teaching process, as well as in curriculum development. Obstacles to developing critical thinking through school education may arise not only from teachers' ignorance and lack of dedication and insufficient training of future teachers but also from other features of the education system (Radulović, Stančić, 2017, p. 23).

5. Inquiry-Based Learning and Sustainable Development

Education where students can progressively overcome stages to achieve outcomes is much more valuable than education that simply conveys raw concepts, working only from textbooks or exercises. Working on complex projects, collaborating, striving to achieve goals, and drawing conclusions helps cultivate a society that is ready to face the challenges of the modern world (Barron, Darling-Hammond, 2013, p. 310). During inquiry-based work, not only does the level of students' knowledge increase, but cognitive independence also develops, allowing students to function better in society and express their opinions more effectively (Konieczny, 2023a, p. 248).

Researchers focusing on inquiry-based learning aim to engage students in an authentic process of scientific discovery. From a pedagogical perspective, the complex scientific process is divided into smaller, logically connected units that guide students and highlight important aspects of scientific thinking (Pedaste et al., 2015, p. 49). These individual units are called phases of inquiry, and their set of connections forms an inquiry cycle. The main essence is to ensure that students achieve cognitive independence. This skill is attainable only when students think, identify problems, and solve them. The problem posed encompasses several educational areas, the research conducted is authentic and relates to real-life situations, and the outcome of students' work results in specific products, such as a debate, an exhibit, or a report. An important element is that students collaborate, as mutual support is essential for achieving the intended goal.

Both inquiry-based learning and education for sustainable development (ESD) occur in stages. Each of these phases is an important element without which the next step cannot be carried out. Below, I have prepared a table illustrating the common features of inquiry-based learning and ESD (Table 1).

Table 1.
Inquiry-Based Learning and ESD

Stage	Inquiry-Based Learning	Education for sustainable development	
1	Understanding, Formulating, and Analyzing the Problem	Recognizing and becoming aware of the existence of local and global issues.	1. Developing a critical observer's attitude and values. 2. Stimulating both external and internal motivation for active participation in society and fostering cognitive independence.
2	Identifying Specific Problems	Recognizing smaller issues that impact the main problem.	Analyzing problems, understanding their connections, and causes.
3	Formulating Hypotheses	Proposing potential causes of problems and their possible effects.	Identifying relationships and causes of social, economic, and ecological issues.

Cont. table 1.

4	Collecting Data and Testing Hypotheses	Observing, analyzing data, and measuring.	Identifying opportunities to change attitudes and values.
5	Solving the Problem	Implementing actions to address or mitigate the effects of the problem.	Transitioning from a passive to an active stance and stimulating a sense of responsibility for the future of the world.

Source: Konieczny, 2017.

The research-based approach to learning in the context of sustainable development involves the active engagement of students in the process of acquiring knowledge through exploration, experimentation, analysis, and critical evaluation of information. Inquiry-based learning is the strategy that most fully embodies the goals of education for sustainable development by fostering the values, skills, and attitudes necessary for addressing the challenges of the contemporary world and future generations (Konieczny, 2017, p. 262).

Students who engage in inquiry-based learning develop critical thinking skills by analyzing diverse sources of information, considering different perspectives, and assessing their credibility. This approach stimulates their ability to identify problems, formulate research questions, and seek solutions. These skills are essential in the context of sustainable development, where developing innovative strategies that address the complexity of social, economic, and environmental issues is necessary. By investigating real-world problems related to sustainable development, students gain knowledge and competencies that enable them to make more informed and thoughtful decisions, both professionally and personally. Understanding the complex interconnections between different aspects of sustainable development better prepares them to evaluate the long-term impacts of their choices. They become more aware of global challenges and are motivated to take action for sustainable development.

6. Conclusion

In summary, I would like to present a section from the research I conducted. The study involved a pedagogical experiment carried out among third-grade primary school students. One of the objectives of the research was to assess the levels of critical and creative thinking among the participants. I employed tools such as knowledge tests, critical thinking tests, and an analysis of students' work products. The study included two third-grade classes, with one serving as the experimental group and the other as the control group. Both classes covered the same material on sustainable development. The experimental group used active learning methods, primarily inquiry-based learning. The experiment lasted for six months. At the end of the experiment, the same tests were administered again as at the beginning of the study.

The findings indicated that knowledge about sustainable development contributes to the development of critical thinking. The experimental group achieved a higher level of knowledge compared to the control group. A positive aspect of inquiry-based learning is the ability to provide immediate feedback. Students become more attuned to the needs and challenges of the modern world. Learning about sustainable development helps in fostering a society that is conscious and responsible, ready to take action. The development of critical thinking provides students with the opportunity to reflect on the contemporary world, the exploitation of its resources, and the responsibility toward other inhabitants of the Earth. Emphasizing rote memorization and requiring only recall of answers or application of simple algorithms does not develop skills in analysis, critical thinking, effective communication in speech and writing, or solving complex problems. A research-based approach to learning in the area of sustainable development not only enhances critical thinking but also prepares students for responsible and informed action in a world that demands skills to handle increasingly complex challenges.

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