Assessment of Sustainable Development Goals into Critical Thinking Skills in Tribal Students of Attapady

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Education for sustainable development, it becomes imperative to sensitize student teachers to evaluate diverse viewpoints and underscore the importance of applying such approaches in their teaching. Critical reflection, as a skill, should be nurtured early in schooling, proving indispensable for comprehending how individuals are conditioned by socio-cultural structures. It's essential for problem-solving, decision-making, resilience, and ethical leadership, promoting sustainable development, empathy, and human rights. This study was conducted in the first tribal block of Kerala, Attappadi. The researcher attempted to ascertain the academic standing of the students from the Attappadi tribe. 251 primary, upper primary, and high school students from different schools of Attappadi served as the sample for this study. To evaluate the collected data, independent sample t test and multivariate analysis were used. The study reveals that children in Attappadi from high school, upper primary, and primary levels show significant differences in their critical thinking abilities based on both gender and community, while no significant differences were observed across the school levels themselves. Incorporating critical thinking into education encourages a flexible, dynamic way of thinking, fostering knowledge, accountability, and morality in a complex world. The findings imply a need for targeted interventions to enhance critical

thinking skills and ensure equitable education access. This study contributes to understanding critical thinking within Attappadi educational context, highlighting the role of gender and community in shaping student abilities.

Keywords: Critical thinking, SDGs- Sustainable Development Goals, Effectiveness, Tribal students, Tribal communities

Introduction

Critical Thinking is the individual's ability to apply higher-order, rational thinking skills such as analysis, synthesis, problem recognition and problem-solving, inference, and evaluation (Sadaf Taimur & Hassan Sattar, 2020). Critical thinking, on the other hand, is the ability to analyse, evaluate, and synthesize information in a logical and reflective manner. It involves questioning assumptions, considering multiple perspectives, identifying biases, and making informed judgments. Life skills and critical thinking play integral roles in achieving the Sustainable Development Goals (SDGs), a universal call to action to end poverty, protect the planet, and ensure prosperity for all by 2030. These skills are indispensable in navigating the complex challenges of the modern world and fostering sustainable development across various spheres of human activity.

If the development of children's critical-thinking skills were simply a function of general maturational processes, there would seem to be little point in trying to encourage them to reason critically about the statements of others. However, the evidence of a link between critical thinking and children's social experiences suggests that it may indeed be worthwhile to attempt to teach children to reason critically. Nevertheless, such efforts will face some challenges, such as opposition based on the fear that children would be encouraged to challenge the authority of parents and teachers. It may also be that children would disregard cues that suggest critical evaluation is warranted if they expect to encounter information that contradicts what they want to hear (Gail D. Heyman, 2008).

Critical thinking is vital for several reasons. Firstly, it fuels problem-solving and innovation, crucial for addressing complex issues like poverty, inequality, and climate change. Secondly, it empowers

individuals to participate actively in decision-making processes, fostering a sense of responsibility towards achieving sustainable development goals. Thirdly, it builds resilience and adaptability, essential for navigating uncertainty and rapid change. Fourthly, it enhances interpersonal relationships and collaboration by promoting effective communication and empathy. Lastly, it encourages ethical leadership and responsible citizenship by inspiring individuals to advocate for positive change and uphold human rights and environmental stewardship.

Critical Thinking is a Key Element in Transforming Higher Education for Sustainability.

Education for sustainability necessitates integration across various disciplines and educational levels to cultivate trans disciplinary competencies, fostering a sustainable society and economy. While standalone sustainability courses offer a starting point, there's a risk of limited application beyond the course. Strategies like specialized e-courses, embedding environmental topics in existing courses, and developing sustainability-focused programs in higher education are vital. Shifting higher education toward sustainability requires embracing nonlinear learning, emphasizing critical analysis over rote memorization. Current challenges include fragmented integration and compartmentalization. Prioritizing "how to think" over "what to think," particularly for future educators, is crucial. Transformative change hinges on fostering critical thinking and reflective learning. Proponents stress interdisciplinary approaches, theory-practice integration, individual commitment, collaborative synergy, ethical dialogue, and critical thinking promotion. Transformational learning emphasizes critical reflection, nurturing informed and engaged citizens capable of addressing complex issues responsibly.

The Individual Dimension

Critical thinking stands as a crucial attribute for individuals to thrive throughout their lives, elevating decision-making to a conscious and intentional level. This elevation contributes to an enhanced quality of life, increasing the likelihood of happiness, successful living, and personal fulfilment. Certain dispositions or attitudes, such as open-

mindedness, inquisitiveness, a desire to be well-informed, flexibility, and respect for others' viewpoints, are integral to the practice of critical thinking (Lai, 2011).

Furthermore, critical thinking plays a vital role in safeguarding the wellbeing of individuals. It enables them to recognize and evaluate various factors, including values, peer pressure, and media influences, which impact their attitudes and behaviour (WHO, 1997). This capacity is instrumental in protecting individuals from violence and radicalization. Those who engage in critical thinking develop an enhanced sense of self-worth and self-efficacy. This empowerment equips them to make well-balanced decisions that consider not only their health and wellbeing but also the demands of their environment. These principles of critical thinking find direct application in individuals' lives.

The Social Dimension

Fostering critical thinking stands as a primary objective in citizenship education, as identified by Giroux (2010), given its pivotal role as a fundamental tool for self-determination and active civic involvement. Critical thinking enables ethical engagement with society, emphasizing informed decision-making, respect for diverse perspectives, and effective communication of personal views. Societal deficiencies in critical thinking can lead to conflicts, financial mismanagement, and inappropriate policies. Therefore, fostering critical thinking in citizenship education is vital for responsible societal participation. In the digital era, where information overflow abounds, critical thinking is essential for distinguishing between facts and opinions, promoting honesty, and combating bias. It empowers active citizenship, driving sustainable societal changes and social justice. Through constructive dialogue, individuals aim to address challenges like extremism and radicalization, contributing positively to solutions.

Critical Thinking and Reflection in Teacher Education

Teacher education globally encompasses varied formats like lectures, seminars, and teaching practice, aiming to mimic real teaching scenarios. Rather than mere knowledge transfer, these programs prioritize critical thinking, experimentation, reflection, and planning. Lifelong beliefs influence how new information is processed, guiding

decisions. Borg underscores beliefs' subconscious role. Challenging existing beliefs requires critical evaluation and embracing new perspectives through reflection. Developing reflective skills aligns with fostering critical thinking, crucial for educators to in still in students. In sustainable development education, sensitizing student teachers to diverse viewpoints fosters transformative learning. Promoting evidence-based reflection ensures tangible outcomes and professional growth.

Critical Thinking is a Key Element in Transforming Higher Education for Sustainability.

To cultivate a sustainable society and economy, education must integrate sustainability across subjects and grades, fostering interdisciplinary skills. While standalone courses are a starting point, there's a risk of limited application. Strategies include embedding sustainability in existing courses, creating specific e-courses, and developing dedicated programs. Shifting higher education towards sustainability requires nonlinear learning, addressing compartmentalization issues. Teaching "how to think" rather than "what to think" is vital, especially for future educators. Critical thinking and reflection are crucial for transformative change. Advocates stress interdisciplinary approaches, theory-practice integration, individual commitment, group synergy, ethical discourse, and critical thinking promotion. Critical reflection is key, nurturing citizens with problem-solving skills and a commitment to responsible actions.

Review of Literature

Kristina Ledman et.al made a study on the topic "Life skills for 'real life': How critical thinking is contextualised across vocational programmes" (2019). This article examines the contextualization of critical thinking in three vocational education and training (VET) programmes: Vehicle and transport, Restaurant and management, and Health and social care. The study uses data from a four-year ethnographic project to explore civic education in Swedish vocational education. Findings show that while teaching primarily focused on 'doing', there were situations that touched upon critical thinking, with three major themes: personal experiences, the other(s), and wider

perspectives. The study also discusses the manifestations of critical thinking in relation to pedagogic rights.

In the current era, with information surging from every corner, critical thinking emerges as a vital tool for navigating complex landscapes and fostering sustainable development. This multifaceted skill goes beyond mere logic; it entails a curious disposition to employ inferences and analyse information, constantly pushing the boundaries of knowledge. Pithers (2000) rightly criticizes traditional lecture methods, highlighting their ineffectiveness in nurturing critical thought. True development of this skill cannot be scripted – it blooms through self-driven inquiry, with teachers acting as guides who ignite curiosity and hone content-specific skills.

Geertsen (2003) offers valuable insights into fostering this mindset, outlining crucial traits like open-mindedness, delayed judgment, and a willingness to explore diverse possibilities. Simpson, Mulvill, and Courtney (2002) developed a criteria-based tool to evaluate critical thinking, aiding teachers in refining their instructional methods. Gruber and Boreen (2003) champion the power of drawing upon students' prior experiences, enriching dialogues and adding depth to their understanding.

At the heart of this transformation lies critical thinking. Educators must equip themselves with a diverse toolkit of strategies, from fostering deduction and interpretation through group discussions to encouraging mindful learning through multiple perspectives, as Langer (1997) suggests. The Infusion approach, integrating critical thinking seamlessly into existing subjects, offers another promising path.

Statement of The Problem

This study intends to bring out the proficiency levels of critical thinking skills in students at the school level in Attappadi. It aims to assess and understand the crucial aspects of critical thinking within the educational context of the region.

Objectives of the Study

1 Evaluate the effectiveness of critical thinking skills across High School, Primary, and Upper Primary students in Attappadi.

2 Compare the effectiveness of critical thinking skills between
   - ♦ High School and Upper Primary students in Attappadi.
   - ♦ Upper Primary and Primary students in Attappadi.
   - ♦ High School and Primary students in Attappadi.

3 To evaluate the critical thinking abilities of male and female students in Attappadi across various educational levels (primary, upper primary, high school).

4 To evaluate the critical thinking skill in different type of communities among students in Attappadi (Irula, Muduga, Kurumba).

Hypothesis of the Study

1. There is no significant difference in critical thinking skills between
   - ♦ Students of high school and upper primary
   - ♦ Students of high school and primary
   - ♦ Students of upper primary and primary
2. There is no significant difference in critical thinking skills between
   - ♦ Male and female students in primary
   - ♦ Male and female students in upper primary
   - ♦ Male and female students in high school
3. There is no significant difference in critical thinking skills between
   - ♦ Irula and muduga community students
   - ♦ Muduga and kurumba community students
   - ♦ Irula and kurumba community students

Methodology of the Study

For the present study, the investigator used normative survey method. This study was conducted in the first tribal block of Kerala, Attappadi. For this study the researcher used random sampling method and selected 251 primary, upper primary, and high school students from different schools of Attappadi. The researcher developed and standardized a Critical Thinking skills test for Tribal Students with an intention to collect the needed data for the present study. The maximum score of the test was 50. The Cronbach Alpha value obtained for the tool is 0.867 which denotes that the tool is highly reliable. The content validity of the tool was also established. Multivariate Analysis and Independent sample t test was employed to analyse the obtained data.

Population and Sample of the Study

The tribal students of Attappady constitute the population of the present study. 251 primary, upper primary, and high school students from different schools of Attappadi.

Tools used for the study

The essential data were collected using the critical thinking test prepared and standardized by the investigator was used. The maximum score of the test was 50

Score categorization: The scores obtained from the critical thinking skills assessment were categorized into three levels: low, medium, and high. This categorization was determined based on percentage ranges, with scores ranging from 0 to 50 percent (<10) classified as low, scores between 50-75 percent (10-15) categorized as medium, and scores exceeding 75 percent (>15) designated as high. This approach aimed to simplify the interpretation of individual scores and facilitate the analysis of critical thinking proficiency across different levels among the student population.

Statistical technique used for the study

Multivariate Analysis and Independent sample t test were employed to analyse the obtained data.

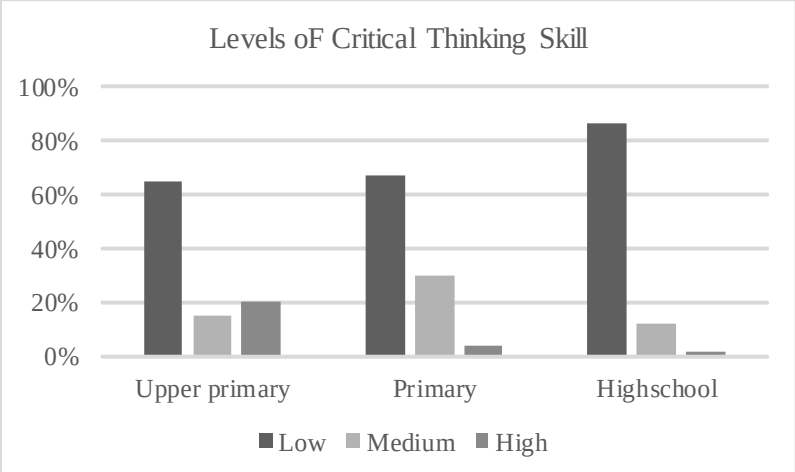
Results and discussions

Table 1 depicts the distribution of critical thinking abilities among students in Attappadi at the Upper Primary, Primary, and High School educational levels. The percentage of students in each of the three categories—Low, Medium, and High—is shown in the figures. Remarkably, low critical thinking skills are demonstrated by a sizable majority of students in Upper Primary (65%), Primary (66.7%), and High School (86.5%). This demonstrates the widespread need for focused interventions and instructional techniques to improve students' critical thinking skills, as most students in Attappadi require them at all educational levels. The statistics for the High group are rather low, even if a lesser percentage falls into the medium category, indicating a moderate level of critical thinking skills.

Table 1

Sections	Upper primary	Primary	Highschool
Low	102(65%)	18(66.7%)	58(86.5%)
Medium	24(15%)	8(29.6%)	8(12%)
High	31(20%)	1(3.7%)	1(1.5%)

Figure 1



Critical thinking skills in students of Attappadi based on their academic achievement.

Table 2

Variable	**N**	**M**	**M_{dn}**	**M_o**	**SD**	**S_k**	**K_u**
Primary	27	6.62	7	8	2.28	-0.275	0.75
UP	157	6.23	4.9	2	4.37	0.486	-1.147
High school	67	5.74	5.4	6	1.85	1.172	2.891

Effectiveness of the students of Attappadi based on their academic achievement

The mean scores are displayed in descending order, with the highest mean (6.62) going to Primary students, then Upper Primary students (6.23), and finally High School students (5.75). This implies

that primary children have the best critical thinking abilities on average, whereas high school students have a somewhat lower mean score.

H_0: There is no significant difference in critical thinking skills between students of high school and upper primary.

Table 3

Variables	N	M	SD	p	
High School	67	5.75	1.85	0.384039541	*p<0.05*
Upper Primary	157	6.23	4.37		

p>0.05, so we failed to reject the null hypotheses and conclude that there is no significant difference in critical thinking skills between students of high school and upper primary in Attappadi.

H_0: There is no significant difference in critical thinking skills between students of high school and primary.

Table 4

Variables	N	M	SD	p	
High School	67	5.75	1.85	0.084797593	*p<0.05*
Primary	27	6.62	2.28		

p>0.05, so we failed to reject the null hypotheses and conclude that there is no significant difference in critical thinking skills between students of high school and primary in Attappadi.

H_0: There is no significant difference in critical thinking skills between students of upper primary and primary.

Table 5

Variables	*N*	*M*	*SD*	*p*	
UP	157	6.23	4.37	0.652373944	*p<0.05*
Primary	27	6.62	2.28		

p>0.05, so we failed to reject the null hypotheses and conclude that there is no significant difference in critical thinking skills between students of upper primary and primary in Attappadi.

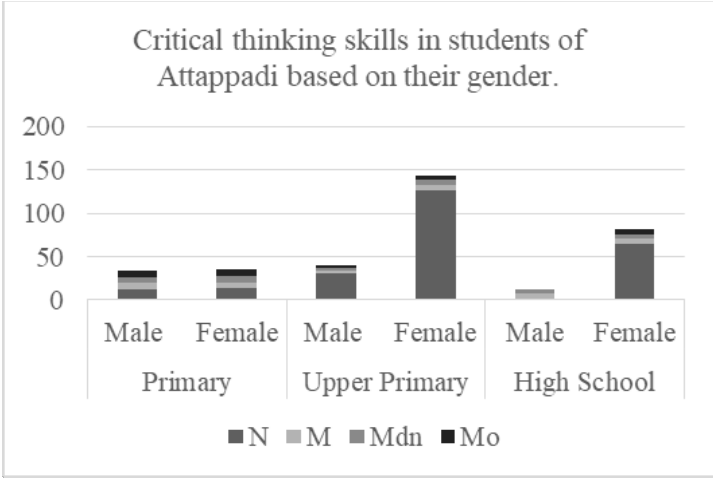
As a result, we draw the conclusion that children in Attappadi who are in high school and upper primary, high school and primary, or both, do not significantly differ in their ability to think critically.

Critical thinking skills in students of Attappadi based on their Gender.

Table: 6

Variable		N	M	M_{dn}	M_o	SD	S_k	K_u
Primary	Male	13	6.75	6.8	8	1.43	-0.26	-0.422
	Female	14	6.50	7.05	8	2.92	-0.15	-0.156
Upper Primary	Male	31	3.63	3	2.5	1.83	0.20	-0.89
	Female	126	6.87	6.15	4	4.58	0.21	-1.43
High School	Male	2	5.05	5.05	0	1.34	0	0
	Female	65	5.77	5.4	6	1.87	1.15	2.80

Figure: 2



H_0: There is no significant difference in critical thinking skills between male and female students in primary.

Table 7

Variables	N	M	SD	p	
Male	13	6.75	1.43	0.779099328	*p<0.05*
Female	14	6.50	2.92		

p>0.05, so we failed to reject the null hypotheses and conclude that there is no significant difference in critical thinking skills between male and female students in primary.

H_0: There is no significant difference in critical thinking skills between male and female students in upper primary.

Table 8

Variables	N	M	SD	p	
Male	31	3.63	1.83	0.000167389	*p<0.05*
Female	126	6.87	4.58		

Obtained p<0.05, so we reject the null hypothesis and conclude that there is a significant difference in critical thinking skills between male and female students in upper primary.

H_0: There is no significant difference in critical thinking skills between male and female students in high school.

Table 9

Variables	N	M	SD	p	
Male	2	5.05	1.34	0.584389915	*p<0.05*
Female	65	5.77	1.87		

p>0.05, so we failed to reject the null hypotheses and conclude that there is no significant difference in critical thinking skills between male and female students in high school.

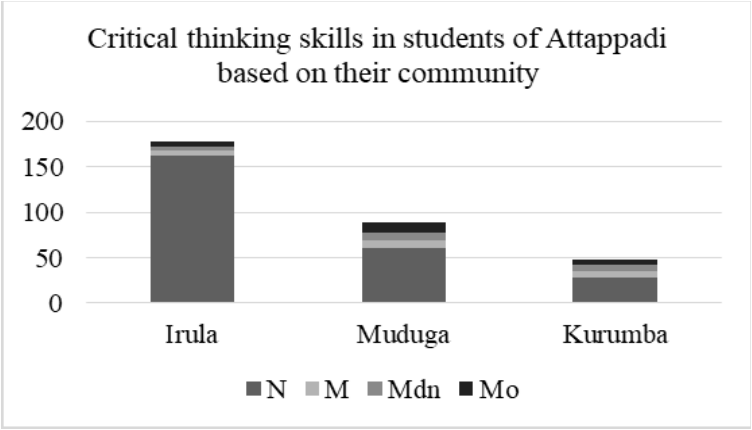
As a result, we draw the conclusion that children in Attappadi who are in high school, upper primary and primary have significantly different in their critical thinking abilities based on their gender.

Critical thinking skills in students of Attappadi based on their community.

Table 10

Variable	**N**	**M**	**M_{dn}**	**M_o**	**SD**	**S_k**	**K_u**
Irula	163	4.80	4.5	6	3.09	1.05	0.97
Muduga	60	9.03	8.65	11.6	3.36	0.07	-0.90
Kurumba	28	7.79	7.05	5.4	3.25	0.17	-1.23

Figure 3



H_0: There is no significant difference in critical thinking skills between Irula and Muduga community students in Attappadi.

Table 11

Variables	N	M	SD	p	
Irula	163	4.80	3.09	1.94716E-13	*p<0.05*
Muduga	60	9.03	3.36		

The p-value of 1.94716E-13 is extremely small, approaching zero. Consequently, we reject the null hypothesis, providing strong evidence to conclude that there is a significant difference in critical thinking skills between Irula and Muduga community students in Attappadi.

H_0: There is no significant difference in critical thinking skills between Muduga and Kurumba community students in Attappadi.

Table 12

Variables	N	M	SD	p	
Muduga	60	9.03	0.07	0.087267773	*p<0.05*
Kurumba	28	7.79	0.17		

Obtained p>0.05, so we failed to reject null hypothesis and conclude that there is no significant difference in critical thinking skills between Muduga and Kurumba community students in Attappadi.

H_0: There is no significant difference in critical thinking skills between Irula and Kurumba community students in Attappadi.

Table 13

Variables	N	M	SD	p	
Irula	163	4.80	3.09	8.77837E-05	*p<0.05*
Kurumba	28	7.79	3.25		

The p-value of 8.77837E-05 is extremely small, approaching zero. Consequently, we reject the null hypothesis, providing strong evidence to conclude that there is significant difference in critical thinking skills between Irula and Kurumba community students in Attappadi

As a result, we draw the conclusion that children in Attappadi who are in high school, upper primary and primary have significantly different in their critical thinking abilities based on their community.

Critical thinking skills in total students of Attappadi based on their gender.

Table 14

Variable	**N**	**M**	**M_{dn}**	**M_o**	**SD**	**S_k**	**K_u**
Male	46	4.58	4.75	6	2.19	0.03	-0.87
Female	205	6.50	5.90	4	3.84	0.47	-0.77

H_0: There is no significant difference in critical thinking skills between male and female students in Attappadi

Table 15

Variables	N	M	SD	p	
Male	46	4.58	2.19	0.0012092	*p<0.05*
Female	205	6.5	3.84		

Obtained p<0.05, so we reject the null hypothesis and conclude that there is a significant difference in critical thinking skills between male and female students in Attappadi.

As a result, we draw the conclusion that children in Attappadi who have significant difference in their critical thinking abilities based on their gender.

Findings

Based on the mean scores displayed in descending order, primary students in Attappadi exhibit the highest average critical thinking abilities, followed by upper primary students, and then high school students. Consequently, there is no significant difference in critical thinking abilities between high school and upper primary students, or between high school and primary students. However, there is a significant variation in critical thinking abilities among children in Attappadi across different educational stages based on their gender and community. Therefore, while educational stages may not significantly impact critical thinking abilities alone, gender and community factors do play a significant role in shaping these abilities among children in Attappadi. Addressing these disparities aligns with SDG 4 (Quality Education) by ensuring inclusive and equitable education for all, as well as SDG 5 (Gender Equality) and SDG 10 (Reduced Inequalities) by promoting gender equality and reducing disparities based on socioeconomic factors. Moreover, the overall higher critical thinking abilities among primary students underscore the importance of early childhood education in laying the foundation for lifelong learning and sustainable development, thus contributing to the achievement of SDG 4 and other interconnected goals related to poverty reduction, health, and environmental sustainability.

Limitations

- The sample is taken only from different Goverment schools of Attappadi tribal block
- A continuous observation of the nature of adjustment of the sample is not practically possible. Hence, the researcher has to confine the data to the responses marked by the samples

Suggestions

Ultimately, the advantage lies in creating environments where students feel empowered to share their ideas and experiences. Engaging in meaningful discussions, facilitated by teachers who encourage brainstorming and diverse viewpoints, unlocks a treasure trove of potential. This collaborative process, built on the bedrock of critical thinking, has the power to ignite not only individual growth but also collective initiatives towards a more sustainable future. By actively

fostering these skills, we empower individuals to become proactive agents of change, capable of tackling the complex challenges that lie ahead and building a thriving future for generations to come.

To enhance critical thinking skills in tribal students from Attappadi through quality education and align with the Sustainable Development Goals (SDGs), we can focus on the following key areas:

- **Culturally Relevant Curriculum**: Incorporate indigenous knowledge, language, and cultural practices into the curriculum to make learning more relevant to students' lives. This fosters critical thinking by connecting education to real-world issues they face, supporting SDG 4.
- **Teacher Training in Indigenous Contexts**: Equip teachers with the skills to deliver culturally responsive teaching, which builds on students' traditional problem-solving methods. This not only enhances critical thinking but also aligns with SDG 4 by promoting inclusive and equitable education.
- **Problem-Based Learning with Real-World Application**: Focus on projects related to environmental sustainability and community challenges. By solving these practical problems, students can develop critical thinking, supporting both SDG 4 and SDG 13 (Climate Action).
- **Access to Educational Resources and Technology**: Improve school infrastructure and access to learning tools, ensuring equitable learning opportunities for tribal students. This address both SDG4 and SDG 10 as well.
- **Community Involvement in Education**: Engage community elders and leaders in the educational process, incorporating traditional wisdom into learning. This approach enhances collaborative critical thinking and strengthens ties with SDG 17 (Partnerships for the Goals).

By focusing on these key areas, we can create a more inclusive and supportive environment that nurtures critical thinking skills while aligning with global development goals.

But this journey demands unwavering commitment. Continuous practice, not just for students but also for teachers through

dedicated training programs, is the fuel that propels progress. By nurturing optimism and rational thinking at all levels, we cultivate a vibrant community of critical thinkers – the architects of a sustainable future.

Conclusion

In conclusion, critical thinking emerges as an indispensable skill that transcends disciplinary boundaries and educational levels. Its multifaceted nature allows individuals to navigate complex challenges, make informed decisions, and engage in thoughtful problem-solving. As critical thinking skills are developed, students not only improve their cognitive capacities but also develop the ability to critically analyse information and take a critical stance on concepts.

Critical thinking is foundational for success in various aspects of life, from academic pursuits to professional endeavours. Its incorporation into education encourages a flexible and dynamic way of thinking, which leads to a lifetime of learning. The significance of critical thinking in moulding knowledgeable, accountable, and morally-minded people only grows as we traverse an ever more intricate and linked world. As a result, developing and emphasising critical thinking abilities should continue to be a top priority in education since they enable people to overcome obstacles and make valuable contributions to a varied and quickly evolving global environment. Studies conducted on tribal pupils in places like Attappadi have shown that combining traditional knowledge with contemporary education develops critical thinking skills at a deeper level. When given critical thinking exercises centred around real-world scenarios, like handling health emergencies or managing natural resources, students in these communities typically perform exceptionally well in decision-making and problem-solving.

According to the data that is currently available, tribal students' critical thinking abilities are very context-specific and frequently have their roots firmly planted in their cultural, social, and environmental realities. The best educational strategies for promoting critical thinking are those that value and include indigenous knowledge, encourage inquiry-based learning, and employ contextualised curricula. However, in many indigenous groups, systemic obstacles including inadequate educational infrastructure, language hurdles, and

socioeconomic marginalisation continue to impede the full potential of these skills.

Remember, critical thinking is the compass that guides us through the complexities of our world. It empowers us to question, to analyse, and to build a future where humanity and nature thrive in harmony. By weaving this invaluable skill into the fabric of education, we ensure that the seeds of sustainability take root and blossom for generations to come.

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