Linguistic Determinant of Higher Order Cognitive Abilities: The Impact of Language of Instruction on Creative Thinking and Critical Thinking

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Abstract: Background: In the transition toward Industrial Revolution 5.0, the cultivation of higher order cognitive abilities, specifically creativity and critical thinking, has become a prerequisite for academic and professional excellence. While global frameworks (UNESCO, UNICEF) and India's National Education Policy (NEP) 2020 advocate for mother tongue-based instruction, there is an increasing shift toward English (L2) mediums. Despite theoretical links between language and cognition, empirical evidence remains scarce regarding how the language of instruction predicts creative thinking and critical thinking. **Objectives:** To compare the creative thinking of students receiving instruction in their mother tongue (Bengali) with those receiving instruction in a second language (English).To compare the critical thinking of students receiving instruction in their mother tongue (Bengali) with those receiving instruction in a second language (English).To determine whether language of instruction predicts creative thinking. To determine whether language of instruction predicts critical thinking. **Methodology:** A descriptive survey research design was employed on a sample of 280 Grade IX students, aged 14-16 years, from various schools in West Bengal, India. Creative thinking was measured using Mehdi's (1973) Verbal Test of Creative Thinking (VTCT), and critical thinking was assessed via the Ghosh and Saha Critical Thinking Test (GSCTT). The data were analyzed using independent samples t-tests and linear regression. **Results:** The findings revealed that Bengali-medium students scored significantly higher in creative thinking and critical thinking compared to their English-medium counterparts ($p < .01$). Regression analysis indicated that the language of instruction is a significant predictor of cognitive abilities, accounting for 54.8% of the variance in creative thinking ($R^2 = .548$) and 54.1% of the variance in critical thinking ($R^2 = .541$). **Conclusion:** Instruction in the mother tongue reduces extraneous cognitive load, enabling students to utilize mental resources for higher-order thinking. These results provide empirical support for NEP 2020 mandates, suggesting that educational systems must prioritize the mother tongue to ensure language acts as a bridge rather than a barrier to cognitive development.

Keywords: Mother Tongue, NEP 2020, Creative Thinking, Critical Thinking, Language of Instruction, Higher-Order Thinking Skills (HOTS), Cognitive Development

Introduction

Higher-order cognitive abilities in 21st-century education

As the global landscape transitions from the automation-driven Industry 4.0 to the human-centric era of Industry 5.0, cultivating higher-order cognitive abilities has become a prerequisite for academic and professional excellence. In this era, students must move beyond rote memorization toward complex cognitive processing. According to Bloom's Taxonomy (1956), while lower-order thinking involves recall and application, higher-order thinking encompasses analysis, evaluation, and creation (Anderson & Krathwohl, 2001). The Partnership for 21st Century Learning (P21) identifies the "4Cs"—critical thinking, creativity, collaboration, and communication—as essential competencies.The primary components of 21st-century skills include critical thinking that enables students to evaluate information, construct logical arguments, and solve problems independently (Altun & Yildirim, 2023; Paul & Elder, 2006) and problem-solving, applying reasoning to real-world challenges. Creativity and innovation involve generating original ideas, 'thinking outside the box,' exploring novel solutions, and adapting to change. Finally, communication and collaboration, encompassing written, verbal, and digital literacies, allow students to convey complex ideas clearly and engage in meaningful, goal-oriented dialogue. The emphasis on higher cognitive abilities has garnered global attention, becoming a focal point in educational research and policymaking. Research by the OECD (2009) and UNESCO (2016) across various nations highlights the importance of fostering creativity and critical thinking as core competencies to be cultivated by modern educational systems (Care, 2018). Furthermore, international assessments, such as the Programme for International Student Assessment (PISA), have begun exploring robust methods for measuring these competencies.

Language as a determinant of cognitive development

Higher order cognitive abilities such as creativity, critical thinking, are not universal; they are shaped by cultural contexts (Bray et al., 2023). Scholars such as Csikszentmihalyi (1996) emphasized thatcreativitymustbeunderstoodwithinthesocio-culturalenvironment. Similarly, critical thinking performance varies significantly across cultures, influenced by differing educational traditions and social norms (Manalo et al., 2013). Identifying the socio-linguistic determinants of these higher cognitive functions is of urgent pedagogical importance.As the primary "tool of culture" (Vygotsky, 1986), language exerts a profound effect on cognitive maturation. Higher-order thinking relies on linguistic development to organize complex ideas; thus, a deficiency in language proficiency can significantly impede the development of these processes (Pettifor, 1968). Beyond communication, language is inextricably linked to the thinking process itself (Tomasello, 1999) and is pivotal in developing autobiographical memory (Wang & Ross, 2007). Empirical evidence suggests that when linguistic processing is disrupted, individuals demonstrate a less sophisticated

and flexible capacity for solving complex problems (Baldo et al., 2005). This underscores that linguistic mastery is not merely a skill, but a prerequisite for the cognitive flexibility required in higher-order reasoning and conceptual thinking (Carruthers, 1996; Hermer et al., 2001).

Theoretical framework: Sociocultural and cognitive perspectives

Sociocultural Theory: Pioneered by Lev Vygotsky (1987), Sociocultural Theory posits that social interaction and culture are fundamental to cognitive growth. Vygotsky (1978) distinguished between "elementary mental functions"—innate abilities like basic attention and perception—and "higher mental functions," such as intentional memory and complex problem-solving. These higher functions are not innate; they are mediated by cultural tools, most notably language. Through semiotic mechanisms, language acts as the essential mediator that allows elementary functions to mature into sophisticated mental processes. Vygotsky further delineated the evolution of language from social speech to private speech, and finally to "inner speech"—an internalized tool for advanced cognitive processing. This progression demonstrates that linguistic development is inextricably linked to the maturation of higher-order cognition.

Cognitive load theory

Cognitive Load Theory (CLT), developed by John Sweller (1988), elucidates how the human brain processes information within the limited capacity of the working memory. Optimal learning occurs only when the cognitive load—the total mental effort exerted—is effectively managed. Exceeding this threshold results in "cognitive overload," which hinders comprehension and long-term retention. In a global educational context, teaching academic content in a foreign language (L2) without adequate support imposes an immense "extraneous cognitive load" (Roussel et al., 2017). Students are forced to process two distinct channels simultaneously: the complex academic content and the unfamiliar linguistic medium. This dual demand saturates the working memory, diminishing the capacity for the higher-order cognitive processing required for creativity and critical thinking.

Policy frameworks on language of instruction

The United Nations Sustainable Development Goals (2015) identify the language of instruction as a critical pillar for achieving equitable, quality education. Since UNESCO's seminal 1953 paper, The Use of Vernacular Languages in Education, the international community has recognized the mother tongue as the optimal medium for instruction. This medium allows children to understand and express complex ideas freely, providing a cognitive foundation that a second language (L2) often obscures. UNESCO (2003) further reinforced that learners who begin in their mother tongue (L1) demonstrate superior long-term academic performance compared to those forced into a new language early in their development (Daniel, 2003). Consequently, L1-based

instruction is now increasingly categorized as a fundamental linguistic and human right (May, 2012).In India, since independence, Indian educational commissions, like the University Education Commission (1948), Mudaliar Commission (1952) and the Kothari Commission (1964–66), and policies National Policy on Education (1986) have consistently advocated for the mother tongue as the primary language of instruction. The latest National Education Policy (NEP, 2020), recommends that 'wherever possible, the medium of instruction until at least Grade 5, but preferably till Grade 8 and beyond, will be the home language/mother tongue/local language/regional language' (Ministry of Education, 2020, p. 13). This policy recommendation aligns with global practices advocated by UNESCO, positioning mother tongue-based multilingual education (MTB-MLE) as the most effective approach for foundational and cognitive development.

Empirical evidence for mother tongue-based instruction

Extensive literature demonstrates the critical role of the mother tongue (L1) in educational success. Cummins (2000) and Madriñan (2014) argue that a strong L1 foundation facilitates second language (L2) acquisition through "common underlying proficiencies," where skills learned in one language naturally transfer to another. Longitudinal evidence suggests that students achieve superior academic outcomes when instructed in their L1 for at least the first six years of primary education (Ball, 2011), as this period is vital for enhancing intellectual development and fundamental cognitive processes (Trudell, 2016).

Beyond academic achievement, L1 instruction preserves the cultural identity and self-esteem of the learner (Ross, 2010). A disparity between the home and school language can lead students to perceive their native culture as insignificant, creating a psychological barrier that diminishes learning capacity (Rubio, 2007). Crucially, Skutnabb-Kangas and Toukomaa (1976) emphasize that L1 development is essential for subjects requiring abstract thought, such as the natural sciences. If L1 development ceases before a child reaches the "abstract thinking phase," they may fail to reach their full latent cognitive potential.

Recent research further highlights the challenges of L2-medium instruction, noting that fluency in the L1 is a prerequisite for subsequent academic success (Debreli & Oyman, 2016; Shin et al., 2015). From a cognitive perspective, the L1 provides the "cognitive support" necessary for linguistic analysis and the execution of demanding mental tasks (Storch & Wigglesworth, 2003).

Rationale of the study

Despite international policy mandates and a wealth of literature establishing the pedagogical advantages of mother-tongue instruction (Cummins, 2000; Skutnabb-Kangas & Toukomaa, 1976), a significant sociolinguistic shift toward English-medium

education persists. In many developing regions, this linguistic aspiration often overlooks the cognitive costs associated with L2-medium instruction.

A critical gap in the existing literature is the heavy focus on primary-level literacy. This study specifically targets secondary school students (Grade IX) because this developmental stage represents a vital transition toward formal operational thought, where abstract reasoning, complex problem-solving, and creative synthesis become the primary focus of the curriculum. While primary education builds the foundation, it is at the secondary level that students must utilize language to navigate high-stakes academic content and develop the higher-order cognitive abilities required for Industry 5.0.

Furthermore, with the global push for competency-based frameworks—represented by policies such as India's NEP 2020—there is an urgent need for empirical data to validate whether L1-based instruction continues to provide a cognitive advantage beyond the foundational years. This study addresses this lacuna by utilizing a robust predictive model to determine how the language of instruction influences the development of creative and critical thinking during this pivotal stage of adolescent cognitive maturation.

Research objectives

The objectives of the study were as follows:

- To compare the creative thinking between students receiving instruction in their mother tongue (Bengali) and those receiving instruction in a second language (English).
- To compare the critical thinkingbetween students receiving instruction in their mother tongue (Bengali) and those receiving instruction in a second language (English).
- To determine whether language of instruction predicts creative thinking.
- To determine whether language of instruction predicts critical thinking.

Hypotheses

Based on the objectives the study formulates the following hypotheses:

H_1: Students receiving instruction in their mother tongue (Bengali) w demonstrate significantly higher levels of creative thinking than those receiving instruction in a second language (English).

H_2: Students receiving instruction in their mother tongue (Bengali) will demonstrate significantly higher levels of critical thinking than those receiving instruction in a second language (English).

H_3: Language of instruction significantly predicts creative thinking.

H_4: Language of instruction significantly predicts critical thinking.

Methodology

Research method

This research was quantitative in nature. Descriptive survey method was used.

Participants

The sample consisted of 280 secondary school students (Grade IX), aged 14–16 years, from various institutions in West Bengal. Of these, 148 students were from Bengali-medium schools and 132 were from English-medium schools. A random sampling technique was employed to ensure a representative distribution. Bengali was the mother tongue (L1) for all 280 participants across both instructional groups.

Variables of the study

- Independent variable: Language of instruction (L1 vs L2).
- Dependent variable: Creative Thinking and Critical Thinking

Research instruments

Two standardized instruments were utilized to measure the dependent variables:

Creative thinking: This was assessed using the Verbal Test of Creative Thinking (VTCT; Mehdi, 1973). The instrument provides a comprehensive measure of three core dimensions: fluency, flexibility, and originality.

Critical thinking: This was measured via the Ghosh and Saha Critical Thinking Test (GSCTT). The test aligns with Facione (1990) framework, encompassing dimensions of interpretation, analysis, inference, evaluation, and explanation. The test was validated using construct, content and face validity. The GSCTT demonstrated high internal consistency, with a Cronbach's α of .94 and a Kuder-Richardson 20 (KR-20) coefficient of .94 (Dastidar & Saha, 2025).

Statistical analysis

Data were processed using SPSS software. Independent samples t-tests were conducted to compare mean scores between the two groups, and linear regression analysis was performed to determine impact of the language of instruction on higher-order cognitive abilities.

Results

Table 1: Results of t-test for Bengali medium and English medium students' creative thinking

Variable with dimensions	Bengali Medium (n=148)		English Medium (n=132)		t (278)	p(one tailed)	Cohen's d
	M	SD	M	SD			
Creative thinking	169.77	19.67	129.13	18.86	17.59	< .001	2.20
Fluency	56.29	7.57	43.34	7.90	13.99	< .001	1.68
Flexibility	56.74	7.07	42.91	7.62	15.76	< .001	1.89
Originality	57.41	7.83	42.39	5.87	17.99	< .001	2.15

Note. N = 280, M=mean; SD = Standard Deviation; df =278

Table 1 indicates that students receiving instruction in their mother tongue scored significantly higher than students receiving instruction in second language (English) in creative thinking and its subcomponents. Bengali medium students (M = 169.77, SD = 19.67) scored significantly higher in total creative thinking than English medium students (M = 129.13, SD = 18.86), t (278) = 17.59, p< .001. The effect size was large, Cohen's d = 2.20, indicating a substantial difference between the two groups.In fluency, Bengali medium students (M = 56.29, SD = 7.57) scored significantly higher than English medium students (M = 43.34, SD = 7.90), t(278) = 13.99, p< .001. The magnitude of the difference was large (d = 1.68).Bengali medium students (M = 56.74, SD = 7.07) also scored significantly higher in flexibility than English medium students (M = 42.91, SD = 7.62), t(278) = 15.76, p< .001, d = 1.89. In originality, Bengali medium students (M = 57.41, SD = 7.83) outperformed English medium students (M = 42.39, SD = 5.87), t(278) = 17.99, p < .001. The effect size for originality was also very large (d = 2.15). These findings strongly supported the directional hypothesis, "H_1: Students receiving instruction in their mother tongue (Bengali) will demonstrate significantly higher levels of creative thinking than those receiving instruction in a second language (English)".

Table 2: Result soft-test for Bengali Medium and English Medium Students' Critical Thinking

Variable with dimensions	Bengali Medium (n=148)		English Medium (n=132)		t (278)	p (one tailed)	Cohen's d
	M	SD	M	SD			
Critical thinking	19.78	3.43	11.86	3.75	18.59	< .001	2.22
Interpretation	4.01	0.98	2.53	1.12	11.98	< .001	1.43
Analysis	4.77	1.18	2.66	1.32	14.12	< .001	1.68
Evaluation	3.36	0.96	2.27	1.08	8.97	< .001	1.07
Inference	3.64	0.91	1.88	1.15	14.06	< .001	1.70
Explanation	3.99	1.00	2.48	1.10	12.01	< .001	1.43

Table 2 indicates that students receiving instruction in their mother tongue (Bengali medium) demonstrated significantly higher than students receiving instruction in second language (English) in critical thinking and all its dimensions.Bengali medium students (M = 19.78, SD = 3.43) scored significantly higher in total critical thinking than English medium students (M = 11.86, SD = 3.75), t(278) = 18.59, p< .001. The effect size was large (Cohen's d = 2.22), indicating a substantial difference between the two groups.In interpretation, Bengali medium students (M = 4.01, SD = 0.98) significantly higher than English medium students (M = 2.53, SD = 1.12), t(278) = 11.98, p< .001, d = 1.43.Bengali medium students (M = 4.77, SD = 1.18) showed significantly higher in analysiscompared to English medium students (M = 2.66, SD = 1.32), t(278) = 14.12, p< .001, d = 1.68.Evaluation scores were significantly higher for the Bengali medium group (M = 3.36, SD = 0.96) than for the English medium group (M = 2.27, SD = 1.08),t(278) = 8.97, p < .001, d = 1.07.In inference, Bengali medium students (M = 3.64, SD = 0.91) scored significantly higher than English medium students (M = 1.88, SD = 1.15), t(247.81) = 14.06, p< .001, d = 1.70. Finally, Bengali medium students (M = 3.99, SD = 1.00) demonstrated significantly better in explanation than English medium students (M = 2.48, SD = 1.10), t(278) = 12.01, p< .001, d = 1.43.The effect sizes, ranging from large to very large, suggest that the language of instruction has a substantial impact on students' critical thinking. The results strongly support directional hypothesis, H_2: Students receiving instruction in their mother tongue (Bengali) will demonstrate significantly higher levels of critical thinking than those receiving instruction in a second language (English).

Table 3. Regression Coefficients of Language of Instruction on Creative Thinking

Dependent Variable	R^2	B	SE B	β	t	p	95% CI for B
Creative Thinking	.548	41.81	2.28	.740	18.35	< .001	[37.32, 46.29]
Fluency	.413	12.95	.93	.643	13.99	< .001	[11.13, 14.77]
Flexibility	.472	13.84	.88	.687	15.76	< .001	[12.11, 15.56]
Originality	.538	15.02	.84	.733	17.99	< .001	[13.38, 16.66]

Table 3 shows that the language of instruction was a significant predictor of total creativity scores, F (1, 278) = 336.58, p< .001. The model explained that language of instruction accounted for 54.8% of the variance (R^2= .548) in total creative thinking. A strong positive relationship was observed (B = 41.81, β = .74, t(278) = 18.35, p< .001), with a 95% CI of [37.32, 46.29].For the dimension of fluency, the regression model was statistically significant, F (1, 278) = 195.78, p< .001, accounting for 41.3% of the variance. The language of instruction significantly predicted fluency scores (B = 12.95, β = .64,

t(278) = 13.99, p< .001), with a 95% CI of [11.13, 14.77].The language of instruction was found to be a significant predictor of flexibility, F (1, 278) = 248.41, p< .001, explaining 47.2% of the variance. The effect was highly significant (B = 13.84, β = .69, t(278) = 15.76, p< .001), with a 95% CI of [12.11, 15.56].Finally, the language of instruction significantly predicted originality,F (1, 278) = 323.64, p< .001, accounting for 53.8% of the variance. The unstandardized coefficient was B = 15.02 (β = .73,t (278) = 17.99, p< .001), with a 95% CI of [13.38, 16.66]. The results strongly support the directional hypothesis, H_3: Language of instruction significantly predicts creative thinking.

Table 4: Regression Coefficients of Language of Instruction on Critical Thinking

Dependent Variable	R^2	B	SE B	β	t	p	95% CI for B
Critical Thinking	.541	7.85	.43	.735	18.09	< .001	[6.99, 8.71]
Interpretation	.305	1.42	.13	.552	11.05	< .001	[1.17, 1.67]
Analysis	.426	2.17	.15	.653	14.36	< .001	[1.87, 2.46]
Evaluation	.225	1.09	.12	.474	8.97	< .001	[0.85, 1.33]
Inference	.386	1.69	.13	.621	13.22	< .001	[1.43, 1.94]
Explanation	.322	1.47	.13	.567	11.49	< .001	[1.22, 1.73]

Table 4 shows that the language of instruction was a highly significant predictor of total critical thinking ability, F (1, 278) = 327.15, p< .001. The model explained 54.1% of the variance (R^2 = .541). Results indicated a strong positive relationship (B = 7.85, β = .74, t = 18.09, p< .001). The regression model for interpretation was significant, F (1, 278) = 122.05, p< .001, accounting for 30.5% of the variance. Language of instruction significantly predicted interpretation (B = 1.42, β = .55, t = 11.05, p< .001). For the dimension of analysis, the model was statistically significant, F (1, 278) = 206.16, p < .001, and explained 42.6% of the total variance. The language of instruction significantlypredicted analysis (B = 2.17, β = .65, t = 14.36, p< .001).The model for evaluation was significant, F (1, 278) = 80.53, p< .001, though it explained a lower proportion of variance (22.5%) compared to other dimensions. Language of instruction remained a significant predictor (B = 1.09, β = .47, t = 8.97, p< .001).Regression results showed that the language of instruction significantly predicted inference scores, F (1, 278) = 174.78, p< .001, explaining 38.6%of the variance. The language of instruction was a highly significant predictor of inference (B = 1.69, β = .62, t = 13.22, p< .001).Finally, the language of instruction significantly predicted explanation, F (1, 278) = 131.97, p< .001, accounting for 32.2% of the variance. A significant positive effect was observed (B = 1.47, β = .57, t= 11.49, p< .001). The results strongly support the directional hypothesis, H_4: Language of instruction significantly predicts critical thinking.

Discussion

The present study revealed that students receiving instruction in their mother tongue (Bengali) scored significantly higher than those receiving instruction in a second language (English) in creative thinking and all itsdimensions, fluency, flexibility and originality.These findings are consistent with Ramasamy (2001) who found thatthe mother tongue medium group scored higher in verbal creativity than English medium group. The finding is also supported by the findings of Sarsani (1999) that revealed that Telugu medium (mother tongue) students performed better than the English (L2) medium students. The reason may be because English medium students are handicapped in expressing their flow of ideas (fluency) and variety of ideas (flexibility) (Sarsani 1999). However, the findings contradict with the findings of Chhajer (2015) that reported English (L2) medium students exhibited higher creativity than Hindi (L1) medium students.Such discrepancies may stem from differences in instructional quality or socio-economic backgrounds. Bengali-medium students outperformed English-medium students most significantly in originality, indicating a superior capacity for generating novel and unconventional ideas. This disparity suggests that L1 learners are able to articulate their thoughts more freely and spontaneously. Because their language of instruction aligns with their mother tongue, Bengali-medium students are more likely to engage in the deep conceptual thinking required for original thought. In contrast, English-medium students often face linguistic barriers when attempting to express complex or unusual ideas in an unfamiliar language, which limits their creative output. The findings are supported by Diba and Priyadarshini (2023) who highlight that education in the mother tongue supports better conceptual understanding and deeper cognitive engagement, both of which are essential for originality.

The findings of the study revealed that students receiving instruction in their mother tongue (Bengali) scored significantly higher than those receiving instruction in a second language (English) in critical thinking and all its dimensions, interpretation, analysis, evaluation, inference and explanation. Bengali medium students outperformed English medium students most notably in the dimension of analysis. This suggests that Bengali medium students possess a stronger ability to examine ideas, identify and evaluate arguments, and engage in logical reasoning compared to their English medium counterparts. The results are supported by Afsahi and Afghari (2017), who found a significant relationship between mother tongue as language of instruction and critical thinking levels, highlighting how mother tongue as language of instruction supports logical reasoning and argument analysis.

The observed differences between Bengali medium (L1) and English medium (L2) students can be attributed to two primary factors. First, mother tongue instruction facilitates deeper cognitive engagement. According to Diba and Priyadarshini (2023), education in the mother tongue supports better conceptual understanding, which is essential for higher-order tasks.The disparity in performance can be attributed to

language proficiency in language of instruction. Bengali medium students were proficient in their language of instruction; on the other hand, English medium students may not be proficient in their language of instruction that may hamper development of their higher cognitive processes. This is supported by Essien (2010), who found that proficiency in the Language of instruction directly enhances performance in mathematics. Similarly, language proficiency is considered essential for cognitive flexibility and problem-solving (Bernardo, 2002; Andleeb et al., 2023).

The findings revealed that language of instruction was a significant predictor of creative thinking and critical thinking. Languageofinstruction could account for 54.8% of the variation in creative thinking, and 54.1% of the variance in critical thinking. These findings are supported by previous research, such as Afsahi and Afghari (2017), who found that language of instruction significantly impacts critical thinking, and that the mother tongue serves as a suitable predictor for developing critical thinking.OECD (2014) emphasized how the instructional language can influence the comprehension and internalization of learned content. Khan (2016) noted that the language through which knowledge is transmitted fundamentally shapes how students think, reason, and apply their learning. Das and Panda (2015) also found that language of instruction significantlyaffectscognitivedevelopment.Research by Storch and Wigglesworth (2003) demonstrates that the first language (L1) provides essential cognitive supportnecessary for executing cognitively demanding tasks. Skutnab b-Kangas and Toukomaa (1976) found that mother tongue development is a prerequisite for reaching the "abstract thinking phase" required for complex subjects like physics and chemistry.The finding is supported by Prophet and Dow (1994) who demonstrated that instruction in an unfamiliar language forces students to exhaust mental energy on "language decoding" rather than "conceptual processing".

The findings revealed that mother tongue as language of instruction is a predictor of higher cognitive abilities, such as creative thinking and critical thinking. This can be attributed to better comprehension, as students are more likely to understand and internalize concepts when taught in the language, they are most familiar with. Improved comprehension enhances their ability to think critically and generate creative ideas. These results are consistent with Gopang et al. (2018), who emphasized that instruction in the mother tongue strengthens students' cognitive engagement. The mother tongue plays a pivotal role in both language acquisition and the maturation of higher-order cognitive processes (Djokaho & Azizah, 2024).

Limitations of the study

- The study was limited to a sample of 280 Grade IX students within the specific context of West Bengal. While the findings offer valuable insights into Bengali-medium and English-medium comparisons, the relatively small sample size may limit the generalizability of the results to the broader population of secondary students across diverse linguistic regions of India.

- The researcher could not control for several external factors such as parenting style, classroom environment, teaching strategies, socio-economic status that may influence creative thinking, critical thinking.

Recommendations

- Schools should strive to implement the mother tongue or local language as the primary language of instruction, at least through Grade 8, to ensure students can focus on developing higher-order skills rather than struggling with language barriers.
- When English (L2) is introduced or used, it should be supported by strong L1 foundations. Proficiency in the mother tongue acts as a cognitive support that facilitates the later acquisition of a second language.
- The government should prioritize strengthening vernacular schools by providing quality education, modern teaching methods, and improved infrastructure rather than merely promoting English-medium schools.

Conclusion

The findings of this study showed the important role of the mother tongue as a linguistic determinant of higher-order cognitive abilities. The results demonstrated that students receivinginstruction in their mother tongue (Bengali) significantly outperform those receiving instruction in second language (English) across all dimensions of creative thinking (fluency, flexibility, and originality) and critical thinking (interpretation, analysis, evaluation, inference, and explanation).

This research provides strong empirical validation for the recommendations of NEP 2020. It underscores that adopting the mother tongue as the language of instruction is not merely a matter of cultural preservation, but a pedagogical necessity for nurturing the intellectual potential of students. By bridging the gap between the home and school linguistic environments, educational systems can more effectively cultivate the analytical and creative minds necessary for success in a globalized world.The alignment between the study findings and NEP 2020 underscores the importance of multilingualism in education. While English proficiency remains valuable in a globalized context, introducing complex subjects initially in the mother tongue can create a strong foundation for cognitive development.

The findings provide actionable insights for educators, parents, and school administrators, allowing for evidence-based decisions that prioritize cognitive development over the socio-aspirational pull of English-medium education. Finally, this research enriches the global discourse on linguistic relativity and cognition, offering a localized perspective from the Indian context that provides valuable parallels for multilingual societies worldwide.

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