

STRUCTURAL RECONFIGURATION OF TEACHER EDUCATION FOR THE ADVANCEMENT OF QUALITY INSTRUCTION AND CRITICAL INQUIRY

Gopal Singh*

**Assistant Professor, Department of Education Chhatrapati Shahu Ji Maharaj University, Kanpur, Uttar Pradesh, India
Email- gopal@csjmu.ac.in ORCID- 0000-0003-0662-6146*

Abstract

The contemporary educational imperative, codified by the United Nations Sustainable Development Goal 4, seeks to move beyond the rudimentary metrics of school enrollment toward the substantive realization of equitable quality education and lifelong learning for all.¹ This transition necessitates a profound re-evaluation of the teaching profession, positioning the educator not merely as a conduit for information but as a primary catalyst for critical consciousness and cognitive development. However, the global educational infrastructure faces an unprecedented crisis characterized by a projected shortage of 44 million primary and secondary teachers required by 2030.³ This deficit is compounded by rising attrition rates, which doubled from 4.62 percent in 2015 to 9.06 percent in 2022, as well as a systemic failure to equip current educators with the pedagogical tools necessary to move beyond rote instruction.³ Consequently, the contribution of teacher education to quality instruction is currently defined by the tension between traditional "banking" models of learning and the emerging requirement for critical, reflective, and inquiry-based pedagogies.

Keywords: *Teacher education, Quality instruction, Critical pedagogy, Critical thinking*

The Philosophical and Theoretical Framework of Critical Thinking

The integration of critical thinking into teacher education finds its primary theoretical locus in the works of John Dewey, who conceptualized the process as "reflective thinking." Dewey characterized this as the active, persistent, and careful consideration of any belief or supposed form of knowledge in light of the grounds that support it and the further conclusions to which it tends.⁵ Within this framework, critical thinking is not an isolated cognitive skill but a holistic dispositional state that requires attentiveness, a habit of inquiry, self-confidence, and intellectual courage.⁵ The educator's role, as envisioned by Dewey, is to foster an environment where students engage in active inquiry—testing ideas against experience and reconstructing their understanding based on outcomes—rather than passively absorbing fixed truths handed down by authorities.⁶

This pragmatic approach to thinking is further enriched by cognitive taxonomies, most notably that of Benjamin Bloom, who situated critical thinking within a hierarchy of educational objectives. In Bloom's taxonomy, critical reasoning is associated with higher-order cognitive tasks such as analyzing, evaluating, and creating.⁷ The implications for teacher education are profound: if educators lack the understanding of these higher-order processes, they are likely to default to lower-order recall methods, thereby stifling the cognitive development of their students.⁸ Empirical evidence suggests that when teacher training programs prioritize the acquisition of these cognitive dispositions, there is a measurable improvement in the ability of candidates to design student-centered, experiential learning environments.⁹

Cognitive Dispositions in Critical Thinking Frameworks

Disposition	Definition and Requirement	Theoretical Source
Attentiveness	The habit of noticing perplexities in messages and recognizing issues that need to be thought through.	Dewey (1933); Facione (1990) ⁵
Habit of Inquiry	The internal push and mental energy to engage in effortful reasoning rather than idle wondering.	Glaser (1941); Hamby (2015) ⁵
Self-Confidence	The willingness to trust one's own ability to inquire and resolve complex problems.	Facione et al. (2001) ⁵
Intellectual Courage	The capacity to think for oneself and challenge existing dogmas despite the fear of error.	Paul & Elder (2006) ⁵
Reflective Skepticism	The ability to question the validity of assumptions and evidence-based claims.	Sosu (2013); Akın (2015) ¹¹

The transition from 20th-century instructional models to 21st-century requirements also demands an understanding of the "non-neutrality" of education. As proposed by critical pedagogues like Paulo Freire, knowledge and language are never objective; they are inextricably linked to power structures and social hierarchies.¹² Freire's critique of the "banking model" of education—where teachers deposit information into students as if they were "empty vessels"—suggests that traditional teacher education may inadvertently prepare educators to be instruments of oppression rather than liberation.¹² To counter this, Freire advocated for "problem-posing education," where learning is both theoretical and practical, fueled by a dialogical interaction that dissolves the rigid hierarchy between teacher and student.¹³

Critical Pedagogy and the Integration of Social Justice

The evolution of teacher education is increasingly informed by the tenets of critical pedagogy, which seek to awaken a "critical consciousness" or *conscientização* in both educators and students.¹³ This process begins when learners become aware of socio-political inequities and take action to mitigate these contradictions. In modern teacher preparation, this involves the application of Critical Race Theory (CRT) and abolitionist teaching to interrogate systemic racism and anti-Blackness within the educational fabric.¹² Educators like Bettina Love argue that teachers who lack an understanding of historical and systemic oppression should not be in the classroom, as they are prone to "blaming the victim" rather than understanding the failures of the justice and social systems.¹²

Furthermore, bell hooks' concept of "engaged pedagogy" emphasizes the wholeness of the student, integrating mind, body, and spirit into the learning process. hooks argues that teaching is a practice of freedom that requires educators to care for the "souls" of their students to create the necessary conditions for deep learning.¹² This holistic approach is a

radical departure from traditional academic models that prioritize cognitive output at the expense of student well-being. For teacher education, this means that the curriculum must include components of self-care and emotional resilience, preparing teachers to survive and thrive within the challenging dynamics of contemporary society.¹²

Theoretical Influences on Modern Critical Pedagogy

Theorist	Key Concept	Impact on Teacher Education
Paulo Freire	Conscientização	Develops awareness of socio-cultural world and potential for transformation. ¹²
bell hooks	Engaged Pedagogy	Centers care, healing, and the holistic well-being of the student (mind-body-spirit). ¹²
Bettina Love	Abolitionist Teaching	Radical effort to restore humanity; interrogates systemic anti-Blackness. ¹²
John Dewey	Learning by Doing	Grounding knowledge in practical, real-world experience and active inquiry. ⁶
Thich Nhat Hanh	Mindfulness	Influenced holistic models of education focused on presence and emotional regulation. ¹²

The integration of these theories into teacher education ensures that educators are not merely technicians of instruction but are agents of social reform. The analysis suggests that without a fundamental change in the individual teacher, no real social change can occur through the education system.¹⁵ This requires a reflective practice that includes the "embodied self," where teachers consistently evaluate the alignment between their liberatory rhetoric and their actual classroom behaviors.¹⁵

Global Models of Excellence in Teacher Preparation

The success of educational systems in countries like Finland and Singapore provides a compelling roadmap for the transformation of teacher education. In Finland, teacher education is centralized around a research-based model where every educator is required to hold a master's degree. This model views teachers as mentors, researchers, and evaluators who are empowered to critically analyze their own teaching strategies and engage in innovation.¹⁷ The Finnish curriculum focuses on holistic development, integrating subjects through broad themes to allow students to see connections between different disciplines and apply critical thinking in real-world contexts.¹⁸

In contrast, Singapore employs a more centralized governance model but has achieved high standards through initiatives like "Teach Less, Think More" and "Thinking Schools." These policies shift the focus from rote achievement to economic development and social cohesion by prioritizing 21st-century skills.¹⁹ While stakeholders in Singapore are consulted through formal channels, they have historically had more limited influence on policy-making compared to the decentralized, consensus-driven model in Finland.¹⁹ Despite these differences, both nations demonstrate that high educational standards are the result of significant investment in teacher preparation and a high degree of professional trust.¹⁷

Comparative Framework of National Teacher Education Systems

Aspect	Finland	Singapore	India (Post-NEP 2020)
Governance	Decentralized; local school autonomy.	Centralized; top-down implementation.	Shifting toward integrated multidisciplinary.
Entry Requirements	Master's Degree; Highly selective.	Top 1/3 of secondary graduates.	Integrated 4-year B.Ed. (ITEP).
Core Philosophy	Research-based inquiry; equality.	Thinking Schools; economic development.	Holistic growth; 21st-century skills.

Assessment Focus	Classroom-based; teacher-led.	Standardized; high-stakes but evolving.	Move from rote to competency-based.
Teacher Autonomy	Very High; Professional researchers.	Moderate; Implementers of national vision.	Evolving; Focus on restoring dignity.

Sources: ¹⁷

The Indian context, as defined by the National Education Policy (NEP) 2020, represents a significant attempt to modernize teacher education by introducing the 4-year Integrated Teacher Education Program (ITEP). This program aims to combine subject expertise with pedagogy, foundational skills, and Indian values in multidisciplinary institutions.⁹ The NEP 2020 recognizes that capable and committed teachers are essential for the effective implementation of education policies, particularly with advancements in technology.⁹ However, the success of this reform depends on the ability of the system to shift from the prevalent "coaching culture" and rote memorization toward an inclusive and holistic approach to learning.²¹

Empirical Analysis of Inquiry-Based Learning and Critical Thinking

Inquiry-Based Learning (IBL) has emerged as one of the most effective pedagogical strategies for fostering critical thinking skills in students. A systematic review and meta-analysis of studies conducted between 2000 and 2024 showed

a substantial mean effect size of **1.27** on critical thinking skills, indicating that IBL significantly outperforms traditional instructional methods.²² The effectiveness of IBL is rooted in its ability to actively engage students in exploring real-world problems, thereby promoting deeper understanding and analytical reasoning.¹⁰

However, the efficacy of IBL is heavily influenced by several moderating factors. Subgroup analysis reveals that the intervention is most powerful at the undergraduate level, where the Standardized Mean Difference (SMD) reached **2.66**, likely because these students possess the analytical capacity to engage deeply with complex inquiry processes.²²

Furthermore, the field of study plays a role, with Physics showing a very strong effect size ($SMD = 2.27$), followed by Chemistry (**1.58**) and Biology (**0.95**).²² The utilization of interactive digital media, such as computer simulations and digital games ($SMD = 3.98$), also significantly enhances the impact of IBL compared to traditional printed materials ($SMD = 1.02$).²²

Moderating Factors of IBL Efficacy (Meta-Analysis Data)

Variable	SMD Value	Level of Effectiveness
Undergraduate Level	2.66	Substantial / Very High
Elementary Level	Moderate	Low to Moderate
Digital Games / ICT Media	3.98	Exceptionally High
Physics Education	2.27	Very High
Biology Education	0.95	Moderate
1-4 Week Duration	Low	Insignificant to Low
Multi-week Curriculum	1.18+	High

Sources: ²²

The data suggests that for IBL to be successful, teacher training must shift its focus from content delivery to facilitation. Educators must act as guides who provide structured guidance to prevent "cognitive overload," as students may otherwise struggle with the open-ended nature of inquiry.⁸ Despite these proven benefits, many pre-service teachers find it difficult to integrate critical thinking into their practices due to a lack of precise understanding of the concept and inadequate content knowledge.¹¹ This gap highlights the urgent need for teacher education programs to prioritize the development of both the knowledge and the skills necessary to implement IBL effectively.

Standardized Testing and its Detrimental Effects on Higher-Order Thinking

One of the most significant barriers to the cultivation of critical thinking is the over-reliance on high-stakes standardized

testing. While these assessments were initially intended to promote educational equity and accountability, research indicates they have often had the opposite effect, narrowing the curricular scope and exacerbating achievement gaps.⁴ The pressure to achieve high test scores leads to a "teaching to the test" mentality, where educators prioritize rote memorization and test-taking strategies over deeper conceptual understanding and creative exploration.⁴ Standardized tests often rely on multiple-choice formats that eliminate the consideration of multiple viewpoints, thereby hindering students' ability to engage in critical reasoning and problem-solving.²⁷ Furthermore, this testing focus can lead to increased stress and anxiety for both students and teachers, shifting motivation from intrinsic curiosity to extrinsic rewards.⁴ In under-resourced schools, these tests are frequently used to justify budget cuts and diminish the professionalization of educators, creating an inequitable learning experience that drains resources from already marginalized communities.²⁵

Impacts of Standardized Testing on the Educational Eco-system

Impact Domain	Consequence of Over-Reliance on Testing
Curricular Breadth	Narrowing of focus to core tested subjects; loss of arts, music, and PE. ²⁵
Cognitive Skill	Emphasis on rote recall rather than analysis, synthesis, and evaluation. ²⁶
Teacher Autonomy	Reduction in instructional flexibility and differentiation capabilities. ²⁵
Student Well-being	Increased academic stress and decreased intrinsic motivation to learn. ⁴
Equity and Funding	Perpetuation of disparities between affluent and low-income school districts. ²⁸

The reliance on standardized metrics also influences property values and community stability. Research has shown that houses close to schools labeled as low-performing under high-stakes testing regimes can experience a drop in price of as much as **11%**, creating a lasting stigma that destabilizes communities and further entrenches educational segregation.²⁵ To mitigate these negative outcomes, experts recommend adopting more holistic assessment methods, such as performance-based evaluations, portfolios, and student self-assessments, which provide a closer approximation of how students actually learn and think.⁴

The Role of Social-Emotional Learning and Mindfulness

The integration of Social-Emotional Learning (SEL) and mindfulness into the formal education system represents a paradigm shift in how learning is approached. The Delhi Happiness Curriculum, launched in 2018, is a prominent example of a state-led intervention designed to foster holistic development.¹⁶ By incorporating daily mindfulness sessions, reflective discussions, and storytelling, the curriculum seeks to strengthen students' foundations of well-being, social skills, and critical thinking.²⁹ The underlying philosophy, known as the Happiness Triad, emphasizes that education should not only be about grades but about building character and emotional intelligence.¹⁶

A study conducted by the Brookings Institution found that students participating in the Happiness Curriculum showed improved relationships with teachers, increased participation in class, and a better ability to focus.¹⁴ Interestingly, while mindfulness was strong across all grades, critical thinking skills varied by developmental stage, being most pronounced in grade six.¹⁴ This suggests that SEL curricula are most effective when they are responsive to the social and cognitive maturation of the students. However, implementing such curricula requires immense political will and sustained support, as behavioral interventions are often difficult to assess using traditional metrics.²⁹

Outcomes of the Delhi Happiness Curriculum (Brookings Institution Study)

Learning Outcome	Observations and Evidence
Self-Awareness	Increased ability to recognize and express personal emotions. ¹⁶
Social Skills	Improved peer collaboration and respect for diverse viewpoints. ¹⁶
Critical Thinking	Strongest evidenced gains observed in the sixth

	grade. ¹⁴
Classroom Engagement	Students noted as more willing to speak up and participate actively. ¹⁴
Teacher-Student Bond	Shift toward a more nurturing and communicative relationship. ¹⁴

The inclusion of SEL in teacher education programs is essential to ensure that educators can model these behaviors for their students. When teachers prioritize values and emotional regulation over academic performance alone, they create a "thinking-friendly" environment that allows students to thrive despite external socio-economic challenges.¹⁶ The shift toward programs like NEEEV in Delhi, which focus more on skill development and entrepreneurship, has raised concerns that the systemic emotional support embedded in the Happiness Curriculum may be marginalized.³²

Assessment and Measurement of Critical Thinking in Research

The systematic research of critical thinking within teacher education necessitates robust methodological frameworks that can capture complex cognitive and dispositional variables. The Watson-Glaser Critical Thinking Appraisal (W-GCTA) remains the world's most recognized tool for assessing these abilities, originally developed in the 1920s and revised multiple times to maintain relevance.³³ The Watson-Glaser test measures five key subscales: inference, recognition of assumptions, deduction, interpretation, and evaluation of arguments.³⁵ This psychometric evaluation is used not only in education but also in professional recruitment and development to identify individuals with superior analytical and reasoning capabilities.³³

Other significant tools include the California Critical Thinking Skills Test (CCTST) and the California Critical Thinking Disposition Inventory (CCTDI). The CCTST has been shown to capture gain scores in students' critical thinking over as little as one semester, particularly in health science programs using site-specific curricula.³⁶ The CCTDI, on the other hand, assesses the internal motivations of test-takers to engage in critical thought, measuring scales such as truth-seeking, open-mindedness, and inquisitiveness.³⁶ Reliability coefficients for these instruments typically range from **0.70** to **0.84**, indicating fair to high reliability depending on the testing context.¹¹

Comparison of Critical Thinking Assessment Tools

Test Name	Primary Purpose	Sub-Dimensions Measured
Watson-Glaser (W-GCTA)	Cognitive skill appraisal for recruitment and education.	Inference, Assumptions, Deduction, Interpretation, Evaluation. ³⁵
CCTST	Measuring skills in analysis and inference.	Induction, Deduction, Analysis, Evaluation. ³⁶
CCTDI	Assessing internal motivations and dispositions.	Truth-seeking, Open-mindedness, Systematicity, Analyticity. ³⁶
Cornell Test (CCTT)	Measuring induction and credibility logic.	Prediction, Experimental Planning, Fallacies, Deduction. ³⁶
HSRT	Reasoning in health science contexts.	Analysis, Inference, Interpretation, Evaluation. ³⁶

Despite the existence of these tools, researchers face challenges in using them to generalize findings across larger populations. Mixed methods research, combining quantitative Likert-scale surveys with qualitative Q methodology or semi-structured interviews, offers a more holistic understanding of pre-service teachers' beliefs and practices.²⁴ For example, Q methodology allows for the exploration of subjective "belief patterns" within a group, revealing the complex and sometimes contradictory nature of personally held beliefs that traditional quantitative methods might obscure.³⁷

Challenges and Future Outlook for Teacher Education

The path toward achieving SDG 4 goals is fraught with structural and systemic hurdles. Beyond the immediate teacher shortage, the profession suffers from a lack of autonomy and an increasing administrative burden that limits educators' ability to innovate in the classroom.³⁸ In many regions, the digital divide—the gap between highly digitalized and under-connected countries—threatens to worsen existing educational inequalities.³⁹ While technology integration is essential for modern education, it must be accompanied by sufficient teacher readiness and infrastructure to be effective.⁴⁰

In India, the implementation of NEP 2020 faces challenges related to infrastructure and funding, with research indicating that a vast majority of TEIs are under-equipped to provide the multidisciplinary training required.³⁸ Success will depend on the ability of policy-makers to adapt goals to regional needs and decentralize the implementation process to ensure that one-size-fits-all approaches do not marginalize vulnerable populations.³⁸ Furthermore, there is a clear need for continuous professional development (CPD) that focuses on practical, hands-on training rather than just theoretical lecturing.²⁰

The future of teacher education lies in its ability to foster "global competence"—the capacity to examine local, global, and intercultural issues and understand multiple perspectives.⁴² This requires teacher education students to have opportunities for experiential learning, international partnerships, and the integration of cross-cultural content into the curriculum.⁴² By equipping future educators with these competencies, the system can ensure that they are prepared to guide students in a rapidly evolving, interconnected world.

Conclusion

The contribution of teacher education to quality education and critical thinking is a multifaceted endeavor that requires the synthesis of philosophical theory, empirical pedagogical research, and robust policy intervention. As the analysis demonstrates, the transition from rote learning to critical inquiry is not merely a matter of curricular change but of fundamental professional transformation. Educators must be prepared to move beyond the traditional "banking" model, embracing roles as facilitators of inquiry, mentors of emotional intelligence, and advocates for social justice.

To realize the goals of SDG 4, the global community must address the critical teacher shortage while simultaneously upgrading the quality of teacher training. Systems modeled after Finland's research-based approach or Singapore's skill-focused priorities offer valuable lessons in the power of teacher autonomy and professional trust. In emerging systems like India's, the success of structural reforms like the NEP 2020 will hinge on the sustained commitment to infrastructure development and the restoration of dignity to the teaching profession. Ultimately, the development of critical thinking in students is dependent on the critical consciousness of their teachers; therefore, teacher education must remain the focal point of all efforts to build a more equitable, inclusive, and enlightened society.

References

1. American Dental Education Association. (n.d.). *CTS tools for assessment*. <https://www.adea.org/home/ADEAevents/teaching-resources/critical-thinking-skills-toolbox/pages/cts-tools-for-assessment>
2. AssessFirst. (n.d.). *Watson Glaser test: The ultimate guide to critical thinking assessment in recruitment*. <https://www.assessfirst.com/en/blog/watson-glaser-test>
3. Assessment-Training. (n.d.). *What is a Watson Glaser critical thinking test and does it work?* <https://www.assessment-training.com/uk/blogs/what-is-a-watson-glaser-critical-thinking-test-and-does-it-work>
4. Brookings Institution. (2023). *State-led education reform in Delhi, India: A case study of the happiness curriculum*. https://www.brookings.edu/wp-content/uploads/2023/02/Brief_State-led-education-reform-in-Delhi-India_FINAL-1.pdf
5. Brookings Institution. (n.d.). *The happy classroom: Insights from our study of schools in Delhi, India*. <https://www.brookings.edu/articles/the-happy-classroom-insights-from-our-study-of-schools-in-delhi-india/>
6. *Building critical thinking in pre-service teachers: Dispositions, skills, and standards*. (n.d.). PubMed Central. <https://pmc.ncbi.nlm.nih.gov/articles/PMC12360536/>
7. *Comparative analysis of stakeholder integration in education policy making: Case studies of Singapore and Finland*. (2024). *Societies*, 14(7), 104. MDPI. <https://www.mdpi.com/2075-4698/14/7/104>
8. *Cognitive journal of multidisciplinary studies: Inquiry-based learning strategies and critical thinking skills of college students*. (n.d.). <https://cognizancejournal.com/vol5issue8/V5I843.pdf>
9. *Critical pedagogy*. (n.d.). Open Oregon Educational Resources. <https://openoregon.pressbooks.pub/educationalllearningtheories3rd/chapter/chapter-13-critical-pedagogy-2/>
10. Rollins Teaching and Learning Core. (n.d.). *Critical pedagogy*. Emory University. <https://sph.emory.edu/info/faculty-staff/rollins-teaching-learning-core/teaching-learning-principles/critical-pedagogy>
11. *Critical pedagogy and reflexivity*. (n.d.). UNC Press. <https://janeway.uncpress.org/ijcp/article/699/galley/1292/download/>
12. Lai, E. R. (n.d.). *Critical thinking*. Stanford Encyclopedia of Philosophy. <https://plato.stanford.edu/entries/critical-thinking/>
13. *Curriculum development study for teacher education supporting critical thinking*. (n.d.). *Eurasian Journal of Educational Research*. <https://dergipark.org.tr/en/pub/ejer/article/512647>
14. *Defining teaching quality around the world*. (n.d.). ResearchGate. <https://www.researchgate.net/publication/351630566>
15. F1000Research. (2024). *Systematic review of inquiry-based learning: Assessing impact and best practices in education*. <https://f1000research.com/articles/13-1045>
16. *Frontiers in Psychology*. (2024). *Q methodology as an integrative approach: Bridging quantitative and qualitative insights in a mixed methods study on mathematics teachers' beliefs*. <https://www.frontiersin.org/journals/psychology/articles/10.3389/fpsyg.2024.1418040/full>

17. International Journal of Creative Management Studies. (2024). *A critical analysis of NEP-2020's aspirations and challenges*. <https://www.ijcms2015.co/file/2024/aijra-vol-9-issue-1/aijra-vol-9-issue-1-51.pdf>
18. International Journal of Research Culture Society. (2024). *NEP 2020 and teacher education: Transforming teacher training programs*. <https://ijrcs.org/wp-content/uploads/IJRCS202407016-min.pdf>
19. International Education and Research Journal. (n.d.). *Happiness curriculum: Inculcating mindfulness amongst students*. <https://ierj.in/journal/index.php/ierj/article/download/4068/4721/8610>
20. IJIRT. (n.d.). *Transforming teacher education in India: A critical review of NEP 2020*. https://ijirt.org/publishedpaper/IJIRT169167_PAPER.pdf
21. MEXTESOL Journal. (n.d.). *A mixed methods study on beliefs and practices pertaining to critical thinking among EFL teachers in Philippine public schools: Implications for policymaking*. https://www.mextesol.net/journal/index.php?page=journal&id_article=377601
22. OECD Observatory of Public Sector Innovation. (n.d.). *The happiness curriculum: Inculcating mindfulness and social and emotional learning amongst students every day*. <https://oecd-opsi.org/innovations/the-happiness-curriculum-inculcating-mindfulness-and-social-and-emotional-learning-amongst-students-every-day/>
23. Structural Learning. (n.d.). *John Dewey's theory: Learning by doing*. <https://www.structural-learning.com/post/john-deweys-theory>
24. TIJER. (n.d.). *Impact of standardised testing*. <https://tijer.org/tijer/papers/TIJER2411094.pdf>
25. UNESCO. (n.d.). *Global report on teachers: What you need to know*. <https://www.unesco.org/en/articles/global-report-teachers-what-you-need-know>
26. United Nations. (n.d.). *Goal 4: Education*. <https://www.un.org/sustainabledevelopment/education/>
27. UNICEF. (n.d.). *SDG Goal 4: Quality education*. <https://data.unicef.org/sdgs/goal-4-quality-education/>
28. White Rose eTheses Online. (n.d.). *The impact of teaching an inquiry-based scheme of work on pupils' attainment and critical thinking skills*. <https://etheses.whiterose.ac.uk/id/eprint/17276>