“**The use of critical thinking development technology to form the research competence of specialized school students”**

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**Abstract**: The 21st century is marked by an extraordinary expansion of information and technological advancements. This unprecedented era demands a transformative shift in educational paradigms, emphasizing not only the acquisition of knowledge but also the cultivation of essential cognitive and analytical skills. Within this context, educational systems are increasingly expected to prepare students to thrive in a dynamic, complex, and unpredictable world.

This article investigates the potential of integrating Critical Thinking Development Technology (CTDT) into English language instruction to enhance research competence among students attending specialized schools. These institutions typically serve academically advanced students and aim to prepare them for competitive academic and professional paths. The research explores the theoretical underpinnings of CTDT, analyzes how it intersects with foreign language pedagogy, and presents practical approaches that educators can use in the classroom.

Drawing on both theoretical frameworks and empirical evidence collected through classroom-based experimentation, the study outlines a comprehensive toolkit and methodology that aims to transform traditional language instruction into a multidimensional learning experience. The results show that CTDT not only improves students’ language abilities but also equips them with essential skills for analytical thinking, academic inquiry, and participation in the global knowledge economy.

**Keywords:** critical thinking, research competence, English language teaching, specialized schools, digital literacy, education reform, pedagogy, inquiry-based learning

**Introduction**

The modern educational landscape has undergone transformative changes in recent decades, driven largely by the forces of globalization, rapid digital innovation, and the growing interconnectedness of societies. These developments have reshaped not only how knowledge is accessed and disseminated, but also the fundamental purposes and priorities of education systems worldwide. In today’s information-driven age, students are no longer passive recipients of information confined to textbooks and classroom lectures. Instead, they are immersed in a global digital environment characterized by an overwhelming volume of data, continuous streams of multimedia content, and immediate access to diverse sources of information from around the world.

In this complex and dynamic environment, traditional literacy—defined as the ability to read and write—is no longer sufficient. Students must now acquire digital literacy, media literacy, and most crucially, critical literacy—the ability to question, interpret, and evaluate information with discernment. As learners engage with various sources such as academic journals, news outlets, blogs, social media, and artificial intelligence tools, they must develop the ability to assess the credibility of information, differentiate between fact and opinion, detect bias, and construct well-reasoned conclusions. These competencies form the foundation of critical thinking, a skill now recognized as essential for success in both academic and professional contexts.

In response to these global trends, educational institutions must shift their pedagogical approaches. Schools are no longer viewed as institutions solely dedicated to the transmission of static content. Instead, they are increasingly regarded as learning communities where students are empowered to take ownership of their education through exploration, inquiry, and reflection. Within this evolving paradigm, the development of research competence—defined as the ability to independently formulate research questions, collect and analyze data, and present findings in a logical and coherent manner—has become a central goal of modern education. This competence is not only crucial for academic success at the secondary and tertiary levels, but also serves as a foundational skill for informed civic participation and responsible decision-making in everyday life.

Among the various subjects taught in specialized schools, English language instruction occupies a uniquely strategic position. As the dominant language of academic publishing, international diplomacy, global commerce, and the internet, English serves as a key to accessing knowledge, participating in global conversations, and engaging with diverse cultures. Proficiency in English not only opens doors to educational and professional opportunities but also allows students to explore international perspectives on social, political, and scientific issues. This exposure fosters intercultural awareness and global competence, two attributes that are increasingly valued in our interconnected world.

Furthermore, English classrooms naturally lend themselves to the use of authentic materials, such as newspaper articles, podcasts, TED Talks, scholarly texts, and online forums. These materials provide real-world content that challenges students to think critically, discuss global issues, and conduct research. When combined with targeted pedagogical strategies and digital technologies designed to stimulate higher-order thinking, English instruction becomes an ideal platform for the integration of Critical Thinking Development Technology (CTDT).

CTDT refers to a set of instructional tools, digital resources, and pedagogical approaches aimed at fostering students’ ability to think analytically, reason logically, and approach problems with intellectual rigor. By embedding CTDT into English language education, educators can create dynamic, inquiry-based learning environments that not only improve language proficiency but also develop students’ capacity for research, self-reflection, and informed decision-making.

**Aim and Objectives**

The primary aim of this study is to explore how the integration of CTDT into English language instruction can foster research competence among 10th and 11th-grade students in specialized schools.

The specific objectives include:

To analyze theoretical perspectives that link the development of critical thinking to the enhancement of research competence in students.

To explore pedagogical models that successfully incorporate CTDT into foreign language learning contexts.

To provide practical recommendations and a structured toolkit for English language teachers aiming to adopt CTDT in their classrooms.

To evaluate the impact of CTDT-driven instructional methods on students’ ability to formulate research questions, analyze information critically, and communicate findings effectively.

**Literature Review**

Critical thinking has long been acknowledged as a cornerstone of modern education. Educational theorists and philosophers such as John Dewey (1933) and Matthew Lipman (1991) have laid the conceptual foundation for critical thinking as both a pedagogical objective and a philosophical disposition. Dewey introduced the concept of reflective thinking, which he defined as "active, persistent, and careful consideration of a belief or supposed form of knowledge in light of the grounds that support it and the further conclusions to which it tends." His work emphasized the importance of inquiry-based learning, arguing that education should foster students' natural curiosity and encourage the development of habits of mind that support thoughtful engagement with the world.

In the Kazakhstani context, the shift towards a competency-based model of education aligns with these international trends. National scholars such as S. Kunanbaeva and A.V. Khutorskoy have been instrumental in redefining the goals of education in Kazakhstan. Kunanbaeva (2005) argues that the purpose of schooling should extend beyond the simple acquisition of knowledge and should instead prioritize the development of functional, intellectual, and communicative competencies. Khutorskoy’s (2003) work on the multi-level model of learner competencies supports the integration of metacognitive and affective domains into curriculum design, aiming to produce learners who are capable of transferring their knowledge to real-life contexts.

Critically, the skills associated with critical thinking—such as identifying problems, formulating hypotheses, evaluating the reliability of sources, drawing conclusions from evidence, and reflecting on reasoning processes—are also core components of research competence. In language education, particularly English as a Foreign Language (EFL) contexts, these skills can be strategically embedded into classroom instruction. Scholars such as Paul and Elder (2008) emphasize that critical thinking should be systematically cultivated across the curriculum, and that language instruction provides a natural context for its development due to its emphasis on communication, argumentation, and comprehension of diverse perspectives.

Defining Research Competence

Research competence is a multifaceted and evolving construct that encapsulates a range of cognitive, behavioral, motivational, and reflective skills. According to Weinert (2001), competence involves “the ability to successfully meet complex demands in a particular context through the mobilization of psychosocial prerequisites including cognitive and non-cognitive aspects.” Applied to research, this definition encompasses not only technical proficiency but also the attitudes and habits of mind required for successful inquiry.

In the context of specialized schools, research competence plays a critical role in aligning classroom practices with institutional missions. Such schools often aim to prepare students for academic competitions, university-level research, or career pathways in science, diplomacy, technology, and global affairs. As such, equipping students with the full spectrum of research competencies becomes not only a curricular objective but a strategic priority. Developing this competence through language instruction adds value by fostering skills that are transferrable across disciplines and culturally relevant in today’s interconnected world.

**Methodology**

Research Design

The study utilized a mixed-methods design, which combines the strengths of both qualitative and quantitative research. This approach allows for a more comprehensive understanding of how CTDT affects student learning.

Qualitative Data: Collected through classroom observations, teacher interviews, and student reflections. This helped in capturing the nuances of the classroom environment and individual experiences with CTDT.

Quantitative Data: Pre- and post-tests were used to assess students' research competence and critical thinking abilities. Rubrics and surveys measured specific indicators such as source evaluation, hypothesis formulation, and use of evidence.

The intervention lasted for one academic semester and focused on the integration of CTDT tools and strategies into regular English language instruction.

Participants and Setting

The study was carried out in a specialized secondary school located in Almaty. This institution was selected due to its emphasis on academic excellence and openness to pedagogical innovation. A total of 60 students—30 from the 10th grade and 30 from the 11th grade—participated. The student body was diverse in terms of academic interests, including humanities, sciences, and international studies.

Three experienced English language teachers were selected to implement the CTDT intervention. Prior to the study, they attended a professional development workshop on CTDT principles and practices.

Tools and Instruments

The study employed a variety of instructional tools, assessment instruments, and digital technologies:

Discussion-Based Tasks: These included Socratic seminars, where students analyzed philosophical or ethical dilemmas, and structured debates on current issues.

Argumentative Writing Exercises: Students wrote essays using academic sources, applying logical reasoning and proper citation.

Group Research Projects: Students collaborated on research topics such as “Media Literacy in the Digital Age” or “Cultural Perceptions of Climate Change.”

Digital Resources: Tools like Google Scholar, Zotero, Canva, and Padlet were used for finding, organizing, and presenting information.

A comprehensive rubric was developed to assess performance across five domains: critical analysis, methodological rigor, collaboration, clarity of presentation, and self-reflection.

**Results**

The integration of Critical Thinking Development Technology (CTDT) into English language instruction in specialized schools yielded substantial gains in multiple areas of student development. These results are drawn from both qualitative classroom observations and quantitative assessments conducted throughout the semester-long implementation. The following subsections detail the key domains in which students exhibited marked improvement.

Improved Critical Literacy

One of the most profound outcomes observed was a significant enhancement in students’ critical literacy, particularly in their ability to evaluate the credibility, reliability, and purpose of different information sources. At the start of the intervention, many students lacked awareness of source differentiation and often cited easily accessible but unreliable sources such as personal blogs, social media posts, or commercial news outlets with unverified information.

Through a series of scaffolded instructional activities, students were introduced to criteria for evaluating sources, including authorship, publication venue, citation count, evidence of bias, and date of publication. Tools such as TinEye, which performs reverse image searches, were particularly effective in helping students identify digitally manipulated or out-of-context images, thereby combating visual misinformation. Comparative analysis exercises—where students analyzed the same event reported by different media outlets—allowed them to recognize bias, framing techniques, and agenda-driven narratives.

Over time, students increasingly favored peer-reviewed journals, academic books, and reputable news agencies when conducting research. Teachers observed that students not only questioned the origin of the information they encountered but also began applying fact-checking strategies independently, a critical step in becoming discerning consumers and producers of knowledge.

Enhanced Argumentation Skills

Another key area of improvement was in argumentation and persuasive communication. Prior to the CTDT-based instruction, students often struggled to express their opinions logically and support them with concrete evidence. Argumentative essays lacked structure, and oral debates were frequently marked by emotional appeals rather than reasoned analysis.

The integration of debate formats, such as team policy debates, alongside structured writing tasks (e.g., Toulmin model of argumentation), provided students with a clear framework for constructing and evaluating arguments. Regular engagement in these activities helped students internalize the importance of claims, warrants, evidence, and rebuttals.

As a result, students showed notable progress in organizing their thoughts logically, using academic language, and referencing credible sources to substantiate their points. Teachers noted the frequent use of discourse markers (e.g., “however,” “on the other hand,” “furthermore”) and the strategic inclusion of counterarguments, which reflected a mature understanding of dialogic thinking. This development not only improved their academic writing but also enhanced their ability to engage in respectful and informed classroom discussions.

Growth in Independent Learning

CTDT played a pivotal role in fostering student autonomy and self-directed learning. A cornerstone of the intervention was encouraging students to generate their own research questions based on personal interests or real-world problems. This shift from a teacher-centered to a learner-centered approach significantly increased student engagement and motivation.

Instead of passively receiving information, students took ownership of their learning journeys by identifying topics of interest, conducting background research, selecting methodologies, and presenting their findings to peers. They worked in collaborative groups and received formative feedback throughout the process, which further reinforced their sense of agency.

Teachers observed a marked increase in students’ initiative, time management, and perseverance, particularly in how they handled complex, open-ended tasks. Many students also began to demonstrate metacognitive awareness, reflecting on their strengths and areas for improvement. These habits are foundational not only for academic success but also for lifelong learning and adaptability in diverse professional contexts.

Integration of Digital Literacy

In parallel with cognitive and metacognitive development, students demonstrated substantial gains in digital literacy, a critical 21st-century skill set. The intervention deliberately incorporated various digital tools and platforms, enabling students to gain practical experience in using technology to research, organize, and communicate information.

In addition to research-related tools, students developed proficiency in digital presentation software such as Microsoft PowerPoint, Prezi, and Canva. They learned to integrate multimedia elements—images, infographics, video clips, and audio recordings—into their presentations, enhancing both the clarity and appeal of their final outputs. These competencies are not only essential for academic communication but also align with professional standards for digital communication and project-based collaboration.

Development of Intercultural Competence

The final and equally important area of growth was the development of intercultural competence. As students engaged with English-language materials from diverse cultural perspectives, they encountered a broad spectrum of values, ideologies, and worldviews. Topics such as immigration policy, environmental sustainability, global health, and gender equity were deliberately included to provoke thoughtful reflection and dialogue.

These engagements were structured to promote not just linguistic understanding but also cultural sensitivity and empathy. Students participated in activities that required them to compare cultural practices, interpret differing viewpoints, and discuss ethical dilemmas from multiple perspectives. Teachers encouraged students to reflect on how their own cultural backgrounds shaped their assumptions and interpretations.

As a result, many students began to articulate more nuanced and empathetic views on global issues. They demonstrated increased open-mindedness, curiosity about other cultures, and a willingness to engage in respectful dialogue. This intercultural competence is particularly vital in a globalized world, where successful communication increasingly requires not just language skills but cross-cultural awareness and diplomacy.

**Discussion**

The implementation of CTDT reveals a need for a fundamental shift in pedagogical practices. Teachers must transition from being content deliverers to learning facilitators. Lessons should be structured to encourage exploration, critical inquiry, and collaborative learning.

Effective lesson design includes:

Relevant Themes: Real-world issues that resonate with students' experiences and aspirations.

Cognitive Challenge: Tasks that require higher-order thinking, not just recall.

Collaborative Learning: Group projects and peer feedback systems.

Metacognition: Activities that prompt students to reflect on their own thinking and learning processes.

Recommendations

To support CTDT integration, educators should:

Use a “Challenge–Understanding–Reflection” structure.

Incorporate case studies and multimedia content.

Emphasize formative assessment focused on learning processes.

Provide teachers with ongoing training in digital pedagogy and critical thinking instruction.

**Conclusion**

In conclusion, the integration of Critical Thinking Development Technology (CTDT) into English language instruction represents more than a mere enhancement of traditional teaching methods—it embodies a strategic, future-oriented shift in educational philosophy and practice. In an age where information is abundant, rapidly changing, and often contradictory, equipping students with the ability to think critically, conduct independent research, and engage in meaningful discourse is no longer optional—it is imperative.

This study has demonstrated that CTDT is a powerful tool in fostering research competence among students in specialized schools. By embedding critical thinking exercises into the language learning process, educators can achieve dual objectives: advancing linguistic proficiency and cultivating high-order cognitive skills. Students who were part of this intervention showed measurable growth in their ability to assess information critically, develop structured arguments, engage with digital research tools, and communicate findings effectively—skills that are foundational not only in academia but in all spheres of life.

Furthermore, the success of CTDT in enhancing independent learning, digital fluency, and intercultural competence suggests its potential as a cornerstone of holistic education. In English language classrooms—often seen as gateways to global communication—CTDT encourages students to connect language learning with real-world inquiry and problem-solving. The technology-supported approach also aligns with key goals of 21st-century education, including adaptability, creativity, collaboration, and ethical reasoning.

From a pedagogical perspective, the findings support a move away from content-heavy, memorization-based instruction towards inquiry-driven, student-centered learning environments. English teachers become facilitators of intellectual exploration, guiding students through processes of discovery and reflection. Classroom dynamics transform into collaborative communities of learning, where questioning, analyzing, and synthesizing are as important as grammatical accuracy or vocabulary acquisition.

In the context of specialized schools, where academic rigor and intellectual development are prioritized, CTDT offers a model that is both scalable and sustainable. It aligns with institutional missions of preparing students for higher education, academic research, and globally-oriented careers. Moreover, its flexible framework allows adaptation across various curricular themes, making it an effective strategy not just in language education but across disciplines.