

Impact of Critical Thinking Interventions On Secondary School Students' English Achievement in Khyber Pakhtunkhwa, Pakistan

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Abstract

This study investigated the effectiveness of a critical thinking intervention on secondary school students' academic achievement in English using an exploratory sequential design. A total of 80 students were divided equally into experimental and control groups (N = 40 each). Student Achievement Test (SAT) scores were collected before and after the intervention to measure changes in English achievement. The pre-intervention analysis revealed no statistically significant difference between the experimental group (M = 38.27, SD = 11.29) and the control group (M = 38.30, SD = 11.20), with $t = -0.01$, $p = 0.993$, and effect size = 0.0. This confirmed baseline equivalence between the two groups prior to treatment. Post-intervention results, however, demonstrated a significant improvement in the experimental group (M = 63.40, SD = 17.49) compared to the control group (M = 48.87, SD = 13.11), with $t = 4.20$, $p = 0.001$, and a large effect size of 0.94, indicating the intervention's substantial impact. Within-group comparisons further supported these findings. The experimental group showed a significant increase in achievement scores from pre-intervention (M = 38.27, SD = 11.20) to post-intervention (M = 63.40, SD = 13.40), with paired differences (M = 25.1, SD = 9.45), $t = 16.81$, $p < 0.001$, and a strong correlation ($r = 0.723$). Similarly, the control group exhibited a modest but statistically significant improvement from pre-intervention (M = 38.30, SD = 11.21) to post-intervention (M = 48.87, SD = 13.11), with paired differences (M = 10.57, SD = 7.73), $t = 8.65$, $p < 0.001$, and correlation ($r = 0.809$). Overall, the results confirm that while both groups improved over time, the experimental group receiving the critical thinking intervention achieved significantly greater gains in English performance compared to the control group. These findings highlight the effectiveness of critical thinking strategies in enhancing academic achievement and underscore their potential as a pedagogical tool for improving English learning outcomes among secondary school students.

Key Words: Critical Thinking, English Achievement, Exploratory Sequential Design

Introduction

Achievement in educational careers requires good command over English language. Economic prosperity and social status is linked with competency in English language (Awan & Kamran, 2018). Although Urdu is the national language of Pakistan, but English language has out done Urdu in the

race of superiority. Due to increasing dominance of English language, parents want their children to be well equipped with this language, as it is the gate way to admission and employment in noteworthy institutions (Akram & Ghani, 2012). Language acquisition is a skill, but students may fail to master English as a foreign language because of the way it is taught.

According to Warsi (2004), English language as a subject is generally considered one of the most difficult subjects; hence students tend to show poor results in this subject. As a result of poor performance in English students may develop a negative attitude towards learning in general and towards English in particular. Students' poor performance in board exams is mainly due to incompetence in language skills. Even science students show poor results due to this language barrier. Major reasons of drop out from school and colleges are lack of competence in English among our students. Failure in learning causes low confidence and negative behavior. The classroom environment is not conducive for language acquisition. Khan et al. (2020) wrote that students' negative attitudes toward English significantly contributed to their underperformance at the secondary level. Additionally, the research suggested that students' weaknesses in science subjects at secondary stage were linked to their poor English proficiency. Furthermore, their research study revealed that many students failed their board examinations due to insufficient English language skills development during secondary school.

Ahmad et al. (2013) conducted research to find the factors that influence the teaching of English in Khyber Pakhtunkhwa and found that among the major reasons of underachievement of students in the subject of English, the crucial one is poor teaching method, as the teachers generally rely on teacher - centered methods to complete the course and prepare the students for exams. New activity-based methods are neglected, and students' participation is ignored generally.

Theoretical Foundations of Critical Thinking

Critical thinking is a cognitive process that has evolved over centuries, shaped by various philosophical, educational, and psychological influences. Facione (2015) defined critical thinking as the ability to think clearly and rationally, understanding the logical connection between ideas. It involves being open-minded, inquisitive, and systematic in evaluating information. According to Facione and Gittens (2013) key components of critical thinking are:

- **Analysis:** The ability to interpret and evaluate information and arguments.
- **Evaluation:** Assessing the credibility and relevance of information sources.
- **Inference:** Drawing logical conclusions based on evidence.
- **Reasoning:** Applying logical principles to make sound judgments.

In the Renaissance era, philosophers such as Francis Bacon stressed the importance of empirical observation and evidence-based reasoning. The Enlightenment period further promoted critical inquiry, skepticism, and scientific methods as tools for understanding the world.

In the 20th century, scholars such as John Dewey and Jean Piaget contributed significantly to the development of modern theories of critical thinking in education. Dewey emphasized the importance of reflective thinking and problem-solving in the learning process, while Piaget's work on cognitive development shed light on how children acquire critical thinking skills at different stages of development.

Historical Development of Critical Thinking

The historical evolution of critical thinking can be traced back to ancient Greece, where the Socratic Method was promoted as a means of fostering critical inquiry (Elder & Paul, 2007). This method involved asking probing questions to stimulate reflection and deep thinking. It laid the foundation for the idea that critical thinking is an active and systematic process.

The Enlightenment era further contributed to the development of critical thinking by emphasizing empirical observation and evidence-based reasoning. **Evidence-based research** is a structured method of exploring a problem by gathering, evaluating, and applying trustworthy data and evidence to draw conclusions or guide decision-making. Thinkers like Francis Bacon and René Descartes played pivotal roles in advocating for the systematic use of evidence and rational thought in the

pursuit of knowledge (Davies & Barnett, 2015).

In the 20th century, John Dewey's work on progressive education and experiential learning highlighted the importance of reflective thinking and problem-solving in the learning process (Dewey, 1910). Jean Piaget's theories of cognitive development shed light on how critical thinking skills develop at different stages of childhood (Piaget, 1950). Although critical thinking ability is not directly measurable and is not easy to teach, there is always a chance to enhance these strategies through deliberate teaching.

Defining Critical Thinking: Various Perspectives and Models

Critical thinking has been defined in various ways across different perspectives and modes. Bloom's Taxonomy of cognitive skills (1956) places critical thinking at the highest level, involving activities like analysis, evaluation and synthesis, which go beyond basic knowledge recall. Ennis (1987) emphasizes critical thinking dispositions or traits, including open-mindedness, inquisitiveness, and metacognition, as essential components of critical thinking. Halpern's critical thinking framework includes dimensions such as interpretation, analysis, evaluation, explanation, problem-solving, and decision-making (Halpern, 2003). Critical thinking has been defined in various ways across different perspectives and models. Critical thinking is the intellectually disciplined process of actively and skillfully conceptualizing, applying, analyzing, synthesizing, and evaluating information gathered from, or generated by, observation, experience, reflection, reasoning, or communication, as a guide to belief and action (Ennis, 2011; 2015; 2016; Paul & Elder, 2006).

Ennis' critical thinking dispositions

Robert Ennis' perspective on critical thinking places a strong emphasis on the dispositions or traits that accompany critical thinking. According to Ennis, critical thinkers possess certain attitudes and habits that facilitate their thinking. These dispositions include open-mindedness, inquisitiveness, metacognition, and intellectual integrity, among others (Ennis, 1987).

Ennis' approach is different from other models as it underscores the importance of cultivating a mindset conducive to critical thinking. While the model doesn't offer a visual hierarchy, it highlights the significance of developing intellectual attitudes alongside cognitive skills.

Each of these perspectives and models provides a unique lens through which to understand critical thinking. While some, like Bloom's Taxonomy, emphasize the cognitive skills involved, others, like Ennis' model, underscore the importance of cultivating the right attitudes and dispositions for effective critical thinking. These models collectively contribute to a holistic understanding of critical thinking and its applications in various contexts.

Lipman's framework of community of inquiry (CoI)

Lipman's work in philosophy began in 1972 with the founding of the Institute for the Advancement of Philosophy for Children. He introduced the concept of children as philosophers and focused largely on the development of logical thinking in children (Lipman et al. 1984). His research includes exploring the growth of critical thinking and logic among K-12 students. Since the 1990s, Lipman's work has gained prominence, and his Community of Inquiry (CoI) framework has been applied as a genuine method for fostering critical thinking skills in students in more recent studies (Arbaugh et al., 2008; Buisse et al., 2003).

In addition to Lipman's 1991 work, the role of thought process in Education, other research has examined the effectiveness of the CoI framework (Gardner, 1996; Gregory, 2007; Burgh et al., 2006; Garrison et al., 2001; 2010). Although originally designed for traditional classroom settings, the CoI framework has increasingly been utilized in virtual and mixed mode educational environments. Lipman (2003) notes that CoI is fundamentally a social experience; while inquiry is based on community, not all communities are built around inquiry. Inquiry practices help to bind a community together, aiming to reach conclusions or judgments. Understanding the CoI involves recognizing that it is an activity focused on producing a result, like forming a judgment, drawing a conclusion, or investigating an issue that this process follows the direction of the argument, and that it is interactive

in nature with a specific structure (Lipman, 2003).

A key aspect of the CoI, according to Lipman (2003), is offering subject materiel through problems derived from the child's experience. This requires having some content and instructional material to initiate inquiry; without this, the process is unlikely to occur. The teacher plays a crucial role as a 'cultivator of judgment (Lipman, 1988), responsible for framing subject matter as problems (Lipman, 2003).

Another consideration in applying the CoI is the tendency for people to seek solutions or closure. Scholars like Dewey (1958) and Buchel et al. (1997), and Lipman, 2003) caution against confusing the goal of CoI with the pursuit of definite answers. Instead, participants should focus on enjoying the intellectual process, accepting that not all questions have straightforward answers. The aim is to stimulate different thinking approaches rather than seeking assertive conclusions (Lipman, 2003). The objective is to produce a collective solution or cognitive exploration built from the contributions of all participants.

A notable feature of CoI is learning from others' experiences, which fosters collaborative learning and appreciation of shared experiences. This often occurs in college settings where students listen to each other's contributions, highlighting the importance of understanding that learning is a collaborative process rather than an individual one.

Lipman (2003) outlines a framework based on five stages for implementing CoI in educational settings. This framework is designed to offer insights into the psychological and pedagogical dynamics of classrooms and to enhance learning, teaching, and thinking.

Stage 1 involves presenting texts from various fields centered on aspects of human life like history, cultural studies, psychological inquiry, and philosophical thoughts, through activities like reading aloud or taking turns. This approach helps initiate classroom CoI by involving learners in both reading and listening.

Stage 2 entails presenting questions, acknowledging contributors, setting agendas, and identifying student interests. This stage is characterized by the collaborative efforts of both teachers and students to initiate discussions.

Stage 3 focuses on the sociocultural aspects of educational inquiry. It involves fostering cooperation and unity within the classroom community, which includes the teacher. Key elements of this stage are developing an understanding of the inquiry process and embracing disagreement; becoming familiar with cognitive skills and applying reasoning, criteria, theories and structures, enriched by collective thinking concepts, internalizing cognitive activities; being aware of contextual differences; and allowing arguments to follow their natural course.

Stage 4 emphasizes using questions rooted in academic tradition and teaching students' disciplinary methodologies. This stage also involves exploration based on considering various philosophical viewpoints and selecting concrete problems to reach practical decisions as well as engaging in inquiry about concepts such, person hood, intellectual honesty, communal engagement, and moral excellence.

Stage 5 appreciates additional cognitive reflections and feedback, recognizing the collective importance of reflective and cognitive thinking, as well as individual and communal contributions. It concludes with celebrating the enriched understanding and strengthened judgment that results from the inquiry process.

Lipmann's framework emphasizes the socio-cognitive aspects of learning, but it is important to recognize that both collaborative and intellectual engagement in the classroom depend on the teacher's presence and leadership. This is essential for creating an effective learning environment through social interaction and mental prepositions, whether in physical or digital settings (Xin, 2012). Additionally, achieving the benefits of community discussions and enhancing cognitive skills, such as critical thinking, requires both teachers and students to be skilled and practiced in following the framework.

Paul and Elder's critical thinking model

According to Paul and Elder (2008), critical thinking is the process of enhancing the quality of one's thinking on any topic, content, or issue by actively managing the inherent structures of thought and applying rigorous intellectual standards to them.

Paul and Elder's model of critical thinking is renowned for its comprehensive approach. According to this model, critical thinking is the intellectually disciplined process of actively and skillfully conceptualizing, applying, analyzing, synthesizing, and evaluating information gathered from, or generated by, observation, experience, reflection, reasoning, or communication, as a guide to belief and action (Paul & Elder, 2006). This model envisions critical thinking as a multi-dimensional process, involving various cognitive activities and skills.

Scholars like **Facione** (2015) and **Nosich** (2012) noted that central to their model is the emphasis on the development of intellectual traits, such as intellectual humility, intellectual courage, and intellectual empathy, which facilitate the application of critical thinking in diverse contexts. Their framework encourages individuals to actively engage in questioning, reasoning, and reflection, which are represented as interconnected components in a cyclical process.

The Paul-Elder framework consists of three key components:

1. The elements involved in reasoning.
2. The intellectual standards that should be used to evaluate these elements.
3. The intellectual traits that emerge from consistently applying these standards to the elements of thought, leading to a well-developed critical thinker.

Some researchers suggest combining the Paul-Elder framework with other critical thinking models. For example, the approach of Ennis (1987), which focuses not only on skills but also on the disposition critical thoughtfulness, can enhance Paul and Elder's model by highlighting the relevance and significance of a willingness to engage in critical thinking. Additionally, frameworks like Bloom's Taxonomy, which classify thinking skills from basic knowledge recall to higher-order processes like synthesis and evaluation, align with the Paul-Elder model by emphasizing different levels of cognitive engagement.

Bloom's Taxonomy of Cognitive Skills

Bloom's Taxonomy is a widely recognized structure in education for categorizing cognitive skills. While it is not solely focused on critical thinking, it places critical thinking skills at the highest cognitive level. In this model, critical thinking involves activities such as analysis, evaluation, and synthesis (Bloom, 1956). The taxonomy represents a hierarchy, with lower-order thinking skills like remembering and understanding at the base and higher-order skills like critical thinking and creativity at the top.

While Bloom's Taxonomy is often depicted as a pyramid, with each level building on the one below, it is essential to recognize that critical thinking can be integrated throughout all levels of learning. For example, analyzing information and evaluating ideas are critical thinking skills applicable at both lower and higher levels of cognitive complexity.

One of the most praised features of Bloom's Taxonomy is its clear hierarchical organization. Researchers like Anderson and Krathwohl (2001), who revised the original taxonomy, argue that the structure from lower-order thinking skills (Remembering, Understanding) to higher-order skills (Evaluating, Creating) offers a practical way to organize educational goals. This progression helps instructors design learning outcomes, assessments, and teaching strategies that encourage students to move through different levels of cognitive complexity.

Bloom's Taxonomy provides a broad, adaptable structure that can be applied across a variety of subjects and educational levels. It assists educators in targeting distinct cognitive skills, ensuring that students not only memorize information but also apply, analyze, and create new knowledge. Researchers have highlighted its value in curriculum development and assessment design, making it versatile across multiple disciplines (Krathwohl, 2002).

Bloom's Taxonomy encourages moving beyond rote memorization to foster active learning and deep comprehension. It underscores the importance of student engagement through activities like

application, analysis, and synthesis. This focus has been particularly well-regarded in the academic literature, especially by Anderson and Krathwohl (2001), who revised the taxonomy to reflect a more dynamic and action-oriented approach to learning. The taxonomy aligns well with constructivist learning theories, which emphasize hands-on problem-solving, critical thinking, and meaningful engagement with content. Researchers such as Laurillard (2012) have noted that Bloom's framework fits seamlessly with modern teaching methods that aim to deepen cognitive involvement and encourage problem-based learning. Some researchers argue that Bloom's Taxonomy oversimplifies cognitive development by presenting it in a rigid, hierarchical framework. For instance, Bailin et al. (1999) critique the model for treating cognitive skills as linear and discrete. They contend that real-world thinking often involves more dynamic and interconnected processes, where individuals engage in multiple forms of thinking (e.g., analyzing, evaluating, creating) simultaneously or in a less linear manner.

Another critique is that Bloom's Taxonomy, particularly in its original form, tends to be Western-centric, focusing on individual cognitive processes and sometimes neglecting collaborative or relational learning approaches, which may be more emphasized in non-Western cultures (Zhang, 2020 et al.). Some researchers argue that while taxonomy is useful, it may need to be adjusted to be more inclusive of diverse cultural perspectives and educational contexts.

In the revised version of Bloom's Taxonomy (Anderson & Krathwohl, 2001), the emphasis on using action verbs (e.g., "remember," "analyze," "create") to categorize cognitive skills has been helpful for educators. However, critics like Biggs and Tang (2007) argue that this can lead to a more mechanical approach to teaching, where learning objectives and assessments become focused on technical tasks rather than encouraging deeper engagement and critical reflection. This emphasis on action verbs can detract from the broader goal of fostering genuine inquiry.

Some researchers suggest that taxonomy does not fully capture how higher-order thinking develops over time, as students might not always progress in a linear manner through the levels.

Overall, Bloom's Taxonomy remains a highly influential tool in education, especially for classroom instruction, curriculum design, and assessment. Scholars value its ability to organize learning outcomes and foster progressive cognitive development. However, critiques highlight its limitations, such as its simplified view of cognitive processes, Western biases, and its neglect of emotional and affective learning. To address these issues, some researchers advocate combining Bloom's Taxonomy with other frameworks (such as Paul and Elder's Critical Thinking Model) to create a more holistic, dynamic, and culturally inclusive approach.

Academic achievement among English language learners

Academic achievement among English language learners (ELLs) is a complex and multifaceted issue influenced by a range of factors, including language proficiency, cultural background, and instructional strategies. Recent research in the field of second language acquisition and ELL education has shed light on these factors, offering insights into how to support ELLs in their academic endeavors.

One key factor influencing academic achievement among ELLs is language proficiency. The competence to comprehend and articulate effectively in English is central to success in academic settings where English is employed for instruction. Research by Cummins (2008) emphasizes the importance of both Basic Interpersonal Communication Skills (BICS) and Cognitive Academic Language Proficiency (CALP). While ELLs may quickly acquire BICS for everyday communication, achieving proficiency in CALP, which is essential for academic tasks, may take more time. Educators must recognize this distinction and provide targeted language support.

Additionally, the cultural background of ELLs plays a crucial role in their academic achievement. Research by Valdés (2001) highlights the relevance of teaching practices in alignment with cultural practices that acknowledge and incorporate students' cultural perspectives into the curriculum. Creating a discriminatory and accessible space and culturally responsive learning environment can enhance ELLs' sense of belonging and motivation to succeed academically.

In conclusion, academic achievement in the context of English language learning is influenced by language proficiency, cultural background, instructional strategies, and assessment practices. Recent research has contributed to thorough insight of how to support ELLs in their academic journey, underscoring the importance of differentiated language instruction, teaching with respectful of cultural diversity and assessment strategies. These insights provide a foundation for educators and policymakers to create inclusive and equitable learning environments that promote the academic success of ELLs.

Relationship Between Critical Thinking And Academic Achievement In Previous Studies

Certainly, discussing the relationship between critical thinking and academic achievement in the context of the effectiveness of critical thinking intervention on higher secondary school students' academic self-regulation and achievement in the English subject is crucial. Critical thinking is a cognitive skill that involves the analysis, evaluation, and synthesis of information to make reasoned judgments and decisions (Facione & Gittens, 2013).

Academic achievement refers to students' performance in educational settings, often measured through grades, test scores, and overall academic success. The correlation between critical thinking and academic performance is an essential area of research, as it can significantly impact educational outcomes. To grasp the correlation between critical thinking and academic advancement, it's essential to consider the theoretical framework. Scholars have often drawn on various theories, including:

Bloom's Taxonomy

Bloom's Taxonomy categorizes cognitive skills into six levels, with higher-order thinking skills like analysis, evaluation, and creation being critical constituents of critical thinking. The application of these skills can positively impact academic achievement (Anderson & Krathwohl, 2001). So, it is essential to provide students with exercises based on higher order skills to enable them to face new challenges, using acquired knowledge and abilities in different situations and making logical conclusions and decisions about an issue (Retnawati et al., 2018).

Metacognition

Metacognition includes thinking about one's thinking processes. Critical thinking and metacognition are closely related, as students who engage in metacognitive practices tend to perform better academically (Zohar & David, 2009).

Paul and Elder (2006) highlighted how the Socratic Method can be effectively used to develop students' critical thinking skills. They argue that this method fosters an environment where students engage deeply with the material, question their assumptions, and refine their reasoning abilities through dialogue.

Ennis (2017) conducted a study in United States, involved implementing specific teaching strategies or programs designed to enhance mindfulness, motivation. Surveys, observational methods, or qualitative interviews have been used to assess changes in students' attitudes and behaviours. The participants included students from elementary through high school levels. The study often involved both teachers and students to evaluate the effectiveness of the intervention programs. The findings emphasized the importance of tailoring physical education to foster students' intrinsic motivation and personal relevance.

The findings suggest that fostering critical thinking skills and enhancing students' perceptions of control could be beneficial for improving academic outcomes. Educational interventions that focus on these areas may help first-year students achieve better academic results. The study found that students' disposition towards critical thinking was positively related to their academic achievement. This suggests that students who are more inclined to engage in critical thinking tend to perform better academically. They found a statistically significant correlation between students who received critical thinking training and improved grades across disciplines.

Critical thinking skills are crucial for academic achievement as they enable students to analyze, synthesize, and evaluate information effectively. In the professional world, critical thinking is essential for problem-solving, decision-making, and effective communication, enhances one's ability

to make informed decisions, solve problems, and engage in reflective thinking (Facione, & Gittens, (2016).

Smith and Brown (2019) research focused on the correlation between critical thinking abilities and standardized test scores among 500 high school students of United States. The study demonstrated that students who exhibited stronger critical thinking skills tended to achieve higher scores on standardized tests, suggesting a positive correlation between these skills and academic achievement. Chen and Li (2020) study explored the relationship between critical thinking and academic achievement in secondary education in China, 300 students took part in the study. They found that students who engaged in critical thinking activities in the classroom exhibited better problem-solving skills, leading to higher grades in mathematics and science subjects. The study indicated that enhancing critical thinking skills could lead to better academic performance overall.

Johnson and Brown (2020) conducted a study in the United States focused on the impact of a critical thinking intervention program on high school students' academic achievement in English. The meta-analysis itself did not involve direct participation from individuals but instead aggregated data from various studies. The combined sample sizes of the studies included in the meta-analysis varied, but it typically involved thousands of elementary and secondary school students across different studies. The researchers conducted a meta-analysis, which involved aggregating data from multiple studies that examined the relationship between critical thinking and academic achievement. They found that students who participated in the intervention showed significant improvements in both critical thinking skills and English grades.

Choi and Lee s' (2021) conducted a study in South Korea, aimed to explore how critical thinking influences self-regulation and, consequently, academic achievement. The study typically involved 452 participants. The participants were Bachelor's-level students. They were enrolled in various academic programs. The study found that higher levels of critical thinking were associated with better self-regulation. This suggests that students who are better at analyzing and evaluating information are also more effective in managing their own learning processes. Self-regulation was found to mediate the relationship between critical thinking and academic achievement. This means that critical thinking impacts academic performance indirectly through its effect on self-regulation.

In a study conducted by Smith (2022), it examined how students perceive the significance of their learning experiences and how these perceptions influence their behaviors and academic performance in aeronautical courses. Students who find their learning experiences more meaningful generally report higher levels of engagement and motivation. Positive perceptions correlate with proactive learning behaviors, such as seeking additional resources or participating actively in class. There's often a positive link between meaningful learning experiences and academic success, though this can vary depending on individual context and the nature of the course.

Critical Thinking and Academic Achievement Studies in Pakistan

Several studies have been conducted in Pakistan to investigate the role of critical thinking in learning process. A study conducted by Khatoon and Rehman (2014) investigated that how critical thinking has been incorporated into the secondary school curriculum in Pakistan and how do the teachers try to develop critical thinking skills in students. The researchers found that theoretically critical thinking is valued in Pakistan, but practical application is limited due to focus on conventional teaching practices and insufficient teachers training. To achieve targets given in the 21st century, the curriculum should be based on goal not only in the context of Pakistan but also in also in developing countries across whole of the world. To develop critical thinking, schools should a creative environment and textbooks shall be reflective such as content that enhances students' critical thinking skills. In Pakistani context, very few research studies have been done regarding the development of critical thinking skills in students. The inclination of research is mostly towards instructional practices and teachers' effectiveness (Naseer at al., 2020).

The study examines the challenges in teaching critical thinking in Pakistani secondary schools, identifying issues such as an interdependence on rote memorization, teacher-centered teaching approaches, and a focus on exams. The authors emphasize that these factors impede students' ability to enhance their critical thinking skills and suggest solutions such as adopting interactive teaching methods, fostering a questioning mind-set, and incorporating critical thinking throughout the curriculum (Ali & Sheikh, 2018). Jabeen (2019) examines the development of cognitive abilities in English language classrooms at secondary schools in Pakistan. The findings suggest that English language teaching offers an effective opportunity to motivate students to engage in critical thinking through text analysis, exploring various viewpoints, and honing their argumentation skills.

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Critical Thinking in Education

Critical thinking remains a topic of substantial interest in the educational field, and recent research has shed light on its importance, methods of development, and impact on students' academic performance.

Recent research has highlighted the essential role of critical thinking in student success. A study by

Kruse et al. (2018) examined the impact of a critical thinking intervention on college students' academic performance. The results showed that students who participated in critical thinking activities demonstrated significant improvements in their problem-solving abilities and achieved higher grades compared to those who did not participate.

Recent research has also explored innovative methods for assessing critical thinking skills. Thompson and Duwel (2019) developed a new assessment tool for critical thinking in undergraduate education. Their research introduced a rubric-based approach to evaluating students' critical thinking abilities, providing educators with a more comprehensive and nuanced understanding of students' critical thinking skills.

Research has shown the benefits of integrating critical thinking into the curriculum. A recent study by Bassham (2020) examined the impact of incorporating critical thinking exercises in a philosophy course at a university level. The findings revealed that undergraduate students who engaged in these exercises exhibited improved critical thinking skills and a deeper understanding of complex philosophical concepts.

The growing use of online learning has prompted research into the effectiveness of promoting critical thinking in virtual classrooms. An experimental study by Afify (2019) conducted in Saudi Arabia investigated 103 undergraduate students at university level using strategies for fostering critical thinking in online discussions. Their findings suggested that the use of structured prompts and peer interaction in online forums positively influenced students' critical thinking skills.

Recent research has continued to explore the correlation between critical thinking ability and academic performance. A longitudinal study of 143 junior high school students in Indonesia by Wahono et al. (2020) examined the relationship between students' critical thinking ability's and their performance in STEM (Science, Technology, Engineering, and Mathematics) courses. The study found a positive correlation, emphasizing the importance of critical thinking in STEM education. These recent research studies illustrate the ongoing interest in critical thinking in education and its multifaceted impact on student success, assessment, curriculum design, online learning, and academic achievement.

Critical Thinking in Educational Contexts

The role of critical thinking in educational contexts is multifaceted and fundamental to fostering deeper learning, problem-solving abilities, and informed decision-making. Here are key aspects of its role:

Enhancing learning

Critical thinking encourages students to actively engage with course material, question assumptions, and seek a deeper understanding. It goes beyond rote memorization and promotes meaningful learning through analysis, synthesis, and evaluation of information (Paul & Elder, 2006).

Problem-solving

Critical thinking enables students to approach problems systematically and creatively. It equips them with the skills to identify issues, analyze root causes, and develop innovative solutions (Gagné & Deci, 2005).

Effective communication

In educational contexts, critical thinking supports effective communication. Students learn to express their ideas clearly, construct persuasive arguments, and engage in constructive discussions with peers and instructors. Effective communication includes students' practical demonstration of their speaking skills and critical thinking skills (Johnson & Johnson, 2008).

Preparation for future careers

In an increasingly complex and information-rich world, critical thinking is a crucial skill for career success. It prepares students to adapt to changing environments, solve unforeseen challenges, and make informed decisions in their professional lives (Facione, 2015).

Cultivating lifelong learning

Critical thinking is a cornerstone of lifelong learning. It encourages individuals to continuously seek

knowledge, critically evaluate information, and update their understanding of various subjects and issues (Brookfield, 2012).

Promoting informed citizenship

In educational contexts, critical thinking helps students become informed and responsible citizens. They learn to analyze complex societal issues, assess the credibility of information sources, and engage in civic discourse (Cottrell, 2017).

Facilitating ethical decision-making

Critical thinking encourages ethical reflection. Students learn to consider the ethical implications of their choices and actions, fostering a sense of moral responsibility (Moseley et al., 2005).

In educational contexts, critical thinking is not just a skill but a disposition – a mindset that encourages intellectual curiosity, open-mindedness, and the willingness to question. It empowers students to become independent, self-directed learners capable of tackling complex challenges in academia and beyond.

Research Question

Does critical thinking intervention affect students' academic achievement in the subject of English at higher secondary level?

Research Hypotheses

H₀₁: There is no significant difference in the mean English achievement scores of students in the experimental group and the control group prior to the intervention.

H₀₂: There is no significant difference in the mean English achievement scores of students in the experimental group and the control group after the intervention.

H₀₃: There is no significant difference in the mean English achievement scores of students in the experimental group before and after the intervention.

H₀₄: There is no significant difference in the mean English achievement scores of students in the control group before and after the intervention

Methodology

A true experimental design is chosen for this study to establish a cause-and-effect relationship between the independent variable (critical thinking) and the dependent variables (students' academic achievement). True experimental designs involve random assignment, manipulation of variables, and control groups, ensuring internal validity and allowing for confident conclusions about the effects of the independent variable (Campbell & Stanley, 1963).

By employing a true experimental design, this research aimed to rigorously investigate whether interventions targeting critical thinking skills have a discernible impact on students' academic achievement. This design ensured that observed changes in the dependent variables can be attributed to the manipulation of the independent variable, minimizing the influence of extraneous variables.

Population Of The Study

The study, the population comprised of all students at higher secondary schools of Khyber Pakhtunkhwa, Pakistan.

Sample of the Study

Female Secondary Schools of District Haripur were considered as sample of the study due to feasibility of conducting experimental study in nearby area. Government Girls Higher Secondary School Kangra Colony Haripur, having conditions conducive for the purposed experiment, was selected as the site of research study. A sample of 80 female students from Grade 11 of a public sector higher secondary school in Haripur, Khyber Pakhtunkhwa, was selected for this study. The participants were between 16 and 17 years of age. Based on their English subject results in the secondary school examination, two equivalent groups i.e., experimental and control, were formed using a random sampling technique and a pre-test. Each group consisted of 40 students. The first group was designated as the experimental group, while the second was referred to as the control

group. The study was conducted in Government Girls Higher Secondary School Kangra colony Haripur, Khyber Pakhtunkhwa as this was an educational institution of good repute aimed at imparting quality education at low cost where most students came from middle and lower middle class families.

Sampling Technique

Probability sampling technique was used for the selection of the sample. Random selection and assignments were used for forming experimental and control groups.

Research Instruments

In this study the Researcher made Students' Achievement Test (SAT) for pre and post testing in quantitative phase.

Students Achievement Test (SAT)

The main objective of the pretest was to ensure that both groups demonstrated an equivalent level of prior knowledge about the new concepts that were to be taught during the experiment. As this was an experimental study, tests developed by the researcher were used to evaluate the relative effectiveness of critical thinking skills on students' academic achievement and self-regulation development in achieving a better understanding of English concepts. A researcher-made test approved by the doctoral committee of University of Haripur (Appendix-B) was given to the sampled students at both levels before and after the treatment. The test was designed to measure the academic achievement of the student. MCQs based test was used to obtain objective measurement of students' abilities. The validity of teacher evaluations-based tests, created for use in classrooms, were improved by using a table of specifications (TOS), which can assist instructors in framing the decision-making process during test development. The development of the table of specifications (TOS) involved three steps. In the initial stage, topics and cognitive levels were listed in a table of specifications (TOS). The table included five columns. The left most column represented the chapter taught, English textbook of Khyber Pakhtunkhwa Peshawar was used for content selection for lesson planning, and test items etc. These chapters were selected from the textbook giving due weightage to each portion, fiction, nonfiction, grammar and poetry. Three poems out of six, four chapters based on fiction out of eight and three chapters based on non-fiction out of six chapters were selected. Selection for these chapters has a strong rationale because these chapters include content and exercises based on explicit use of critical thinking skills while reading, interpreting, scanning, analysis, synthesizing and evaluating the information.

The second column from the left showed students learning outcomes (SLOs), in contrast the last three columns represented the cognitive levels of higher order thinking skills in each topic. After tabulating the topics, the researcher found out the percentage share of SLOs and their distribution as illustrated in Table1.

Table1 1

Table of Specification (TOS) Based on Cognitive Domain

Topics	SLOs	Analysis (A)	Synthesis (S)	Evaluation (E)	Marks
i. Grammar	05	2	2	6	10
ii. Good Timber (Poem)	05	5	3	2	10
iii. Mother to Son (Poem)	04	5	3	2	10
iv. Ozmyandias (Poem)	05	5	3	2	10
v. His First Flight (Fiction)	04	4	2	2	08
vi. The Blanket (Fiction)	05	5	2	1	08
vii. A Long Walk Home (Fiction)	05	5	2	1	08
viii. The Progress (Fiction)	04	3	2	1	06

ix. Responsibility of the Youth (Non-Fiction)	04	4	2	2	08
x. Choice of Carrier (Non-Fiction)	05	4	3	3	10
xi. How to take Job Interview (Non-Fiction)	06	6	3	3	12
Total no of SLO, s	52	48	27	25	-
Percentage	100%	48%	27%	25%	100%
Marks	-	48	27	25	100
Total marks	-	-			100

In columns 1, 2, 3, and 4, the table 1 displayed the topics, the number of SLOs in each topic, the percentage of SLOs shared, and the distribution of marks. The following formula was used to calculate the percentage share of SLOs and the distribution of marks per SLO:

Weight in percentage = (No. of SLOs in the topic / Total no. of SLOs) * 100

Weight in marks = Calculated % of Max. Marks

Table 2

Content-wise/Chapter-wise Distribution of MCQ's Test

Topic	No. of SLO's in Topic	Percentage Share of SLO, s	Distribution of Marks
1. Grammar	05	10%	10
2. Good Timber (Poem)	05	10%	10
3. Mother to Son (Poem)	04	7%	10
4. Ozymyandias (Poem)	05	10%	10
5. His First Flight (Fiction)	04	7%	08
6. The Blanket (Fiction)	05	10%	08
7. A Long Walk Home (Fiction)	05	10%	08
8. The Progress (Fiction)	04	7%	06
9. Responsibility of the Youth (Non-Fiction)	04	7%	08
10. Choice of Carrier (Non-Fiction)	05	10%	10
11. How to take Job Interview (Non-Fiction)	06	12%	12
Total	52	100 %	100

In addition, the table 2 of specifications also indicated the number of questions for each cognitive level (analysis, synthesis and evaluation). The researcher opted to focus on these three cognitive categories for higher secondary school students which were analysis, synthesis and evaluation. Analysis was given more weight-age because it is prerequisite for synthesis. Understanding the individual components and their relations is essential before combining and synthesizing elements resulting in a total of 100 multiple-choice questions in the subject of English, based on the works of

Bloom (1956) and Krathwohl (2002). Moreover, the following formula was used to calculate the weight per item per cognitive level:

Number of items = Maximum marks in topic ÷ (Number of SLOs × Number of SLOs in each cognitive level)

Table 3

Distribution of Items based on Cognitive Levels

Topics	Allocated Marks	MCQ's	Analysis	Synthesis	Evaluation
1. Grammar	10	10	2	2	6
2. Poems	30	30	15	9	6
i. Good Timber			5	3	2
ii. Mother to Son			5	3	2
iii. Ozymyandias			5	3	2
3. Fiction	30	30	17	8	5
i. His First Flight			4	2	2
ii. The Blanket			5	2	1
iii. A Long Walk Home			5	2	1
iv. The Progress			3	2	1
4. Non-Fiction	30	30	14	8	8
i. Responsibility of the Youth			4	2	2
ii. Choice of Carrier			4	3	3
iii. How to take Job Interview			6	3	3
Total	100	100	48	27	25

Therefore, the table 3 of specifications (TOS) was constructed in three phases: the topics, SLOs, and cognitive levels were tabulated by the researcher in the first phase, while the percentage share and marks distribution were calculated for each topic in the second phase. In the final phase, the test items were developed in correspondence to topics and cognitive level, the item distribution by cognitive level was tabulated. The generated TOS was used to ensure the reliability and validity of the test items, and it was also used in the assessment process by the evaluation experts of Doctoral committee to determine the alignment of test items with the taught curriculum (DiDonato-Barnes et al., 2011).

Validity and Reliability of Research Instruments

Validity is equivalent to accuracy in research (Brains et al., 2011). Although the test (SAT) was prepared based on appropriate specifications and requirements, content validity was also ensured for the test items. Content validity refers to the degree to which the questions and topics appear appropriate to a panel of evaluators who have excellent knowledge about the subject matter of the test (Korroch et al., 2005). Therefore, reach tool was validated by a panel of experts from the Department of Education at the University of Haripur. As a result, a few test items were revised based on their suggestions/proposals to ensure content validity. A measurement of the research instrument's validity encompasses both internal and external dimensions. Internal validity pertains to potential influences of variables other than the independent variable on study outcomes. When the findings of a particular study can be duplicated by different researchers in varied settings, the results and research instruments are deemed highly valid (Lodico & Voegtle, 2010). To contribute meaningfully, research

instruments must exhibit both reliability and validity.

The reliability of the Student Achievement Test (SAT) was assessed using the Split-Half Reliability method, followed by application of the Spearman-Brown prophecy formula to estimate the full test reliability. For this purpose, the test items were divided into two halves: one consisting of all odd-numbered items and the other of even-numbered items. The correlation between the two halves was calculated, and the Spearman-Brown formula was applied to adjust the reliability for the full test length. The resulting reliability coefficient was **0.81**, indicating a high level of internal consistency and suggesting that the test items consistently measure the intended construct.

Procedure

The study was conducted at Government Girls Higher Secondary School Kangra Colony Haripur. The treatment was conducted over 12 weeks. To evaluate the effectiveness of the critical thinking skills intervention SAT and SRS were used before and after treatment for both the groups. The researcher adopted the following procedure to investigate the impact of critical thinking skills development on academic achievement in grade 11 students' English subject.

Formation of Groups

Randomization was used to distribute students into two equal groups, the researcher created two groups for the present study, an experimental group and a control group. Both the experimental (n=40) and control groups (n=40) were pre- tested. A research instruments was used: the SAT, a 100-question multiple-choice test, administered to both groups before and after treatment,

GGHSS Kangra is a government-run school and admission is granted to every student who passed the SSC level exam. No strict entry test is administered here like all other government schools of elementary and secondary education Khyber Pakhtunkhwa. Students with diverse academic abilities get admission here from high achiever to low achievers. The researcher created a numbered list of 107 students of class X1 studying at the selected school based on their previous over all academic scores at board of intermediate and secondary education Abbottabad in the subject of English at SSC level. These students were in the same age group from 16 to 17 years old and belonged to same residential area.

Pre-test was administered at the beginning for all the listed students in both groups to ensure equity between the groups. Previous studies by Piers and Herzberg (2002); Brown et al. (1993); Akdemir et al. (2012); Sermier Dessemontet and Bless (2013); and Dontoh et al. (2019) informed this effort.

On the basis of results of pre-test the students list was prepared in the descending order from higher achiever to low achiever. Even odd randomization was used to assign these students to experimental and control group. The pre-test achievement scores and self-regulation scale scores of both experimental and control groups, separated randomly, were used as baseline data. After pretesting, 27 students were removed as outliers. These outliers were those students who performed exceptionally well or did not perform at all in pre-tests. Randomly selected 80 students were assigned in two groups Experimental and Control group.

Critical thinking skills intervention was provided to Experimental group only. Selected chapters from the English book were taught to students with explicit critical thinking skills by using critical thinking strategies, while the same selected curriculum was taught to control group using the traditional Grammar Translation method with no explicit instruction of critical thinking skills.

Duration of Intervention

The study lasted for 12 weeks, and it was conducted in a natural setting. Both experimental and control groups were taught selected units from Peshawar board textbook of English. The experimental group was taught using critical thinking skills while the control group received instruction using the usual GMT technique. The allocated time for each session lasted 40 minutes and was utilized effectively without any time being wasted for both groups during the experiment.

Data Collection

The collecting quantitative data, achievement test was administered before and after intervention to both experimental and control group. The researcher visited each group of students during the

administration of the test and helped in collecting data from the respondents (students). Departmental approval was obtained before administering the tools. The data collected was then entered into Excel for further processing. The experiment was conducted for 12 weeks from 1st April to 31st July 2022.

Analysis

Comparison of Mean Scores before Intervention

H₀₁: There is no significant difference in the mean English achievement scores of students in the experimental group and the control group prior to the intervention.

Table 4

Before intervention comparison of students' achievement test (SAT) scores

Groups	N	Mean	SD Score	SE Mean	t-value	Sig.	Effect Size
Pre-Exp	40	38.27	11.29	1.78			
Pre-Cont	40	38.30	11.20	1.77	-0.01	0.993	0.0

In Table 4, the student achievement test (SAT) scores of experimental and control groups before intervention are N (40), Mean (38.27), SD (11.29), SE Mean (1.78) and N (40), Mean (38.30), SD (11.20), SE Mean (1.77) respectively. The mean scores difference is not statistically significant as t-value (-0.01), p (0.993), as $p > 0.05$ with effect size 0.0, indicating that the difference in SAT scores between the two groups is not statistically significant. Hence, H₀₁ failed to be rejected.

Comparison of Mean Scores after Intervention

H₀₂: There is no significant difference in the mean English achievement scores of students in the experimental group and the control group after the intervention.

Table 5

After intervention comparison of students' achievement test (SAT) scores

Groups	N	Mean	SD Score	SE Mean	t-value	Sig.	Effect Size
Post-Exp	40	63.40	17.49	2.77			
Post-Cont	40	48.87	13.11	2.07	4.20	0.001	0.94

In Table 5, the student achievement test (SAT) scores of experimental and control groups after intervention are N (40), Mean (63.40), SD (17.49), SE Mean (2.77) and N (40), Mean (48.87), SD (13.11), SE Mean (2.07) respectively. The mean scores difference is statistically significant as t-value (4.20) and p (0.001). As $p < 0.05$ with effect size 0.94, indicating that the difference in SAT scores between the two groups is statistically significant. Hence, H₀₂ is rejected.

Comparison of Mean Scores of Experimental Groups before and after Intervention

H₀₃: There is no significant difference in the mean English achievement scores of students in the experimental group before and after the intervention.

Table 6

Before and after intervention comparisons between students of experimental groups in student achievement test (SAT) scores

Test	N	Mean	SD	SE Mean	Correlation (p)	Paired Difference			t
						M	SD	SEM	(p)
Pre	40	38.27	11.2	1.78	0.723				
Post	40	63.40	13.4	2.13	(0.000)	25.1	9.45	1.49	16.81 (0.000)

Table 6 shows that the student achievement test (SAT) scores of higher secondary school students before intervention N (40), Mean (38.27), SD (11.2), SE Mean (1.78), and after intervention, N (40), Mean (63.40), SD (13.2), SE Mean (2.13) of experimental groups. For relationship, r (0.723) with p (0.00) and value of p was less than 0.05 showed a significant strong relationship between before and

after intervention SAT scores. Before and after intervention scores of paired differences were Mean (25.1), SD (9.45), SE Mean (1.49) with t (16.81), p (0.000) and p was less than 0.05. Hence “ H_{03} ” is rejected.

Comparison of Mean Scores of Control Groups before and after Intervention

H_{04} : There is no significant difference in the mean English achievement scores of students in the control group before and after the intervention

Table 7

Before and after intervention comparisons between students of control group in student achievement test (SAT) scores

Test	N	Mean	SD	SE Mean	Correlation (p)	Paired Difference			t
						M	SD	SEM	(p)
Pre	40	38.30	11.21	1.77	0.809	10.57	7.73	1.22	8.65
Post	40	48.87	13.11	1.91	(0.000)				(0.000)

Table 7 shows that SAT scores of students in control groups before intervention N (40), Mean (38.30), SD (11.20), SE Mean (1.77) and after- intervention N (40), Mean (43.87), SD Score (12.11), SE Mean (1.91) intervention. The correlation r (0.809), p (0.000) is less than 0.05 also showed a very strong relationship between before and after intervention SAT scores. Paired differences of before and after intervention have Mean (10.57), SD (7.73), SE Mean (1.22). The difference of SAT scores between before and after intervention is statistically significant as t (4.57) and p (0.001) is less than 0.05 therefore difference is significant. H_{04} is rejected.

Discussion

The aim of this study was to test the effectiveness of critical thinking intervention on students’ academic achievement in the subject of English at the higher secondary level through an exploratory sequential study. The qualitative data underscores the centrality of critical thinking in English language education. Teachers at the higher secondary level prioritize not only language proficiency but also higher-order thinking skills such as problem-solving, analytical thinking, creativity, and ethical reasoning. This emphasis aligns with the broader educational goals of preparing students for real-world challenges, fostering independent and creative thinking essential for success in higher education and the workforce.

The finding of the study is consistent with Zhang et al. (2022), as their study also highlights the importance of critical thinking intervention in their experimental study. They also found that embedded critical thinking lesson plans had a significant positive effect on development of academic critical thinking skills. Teachers actively incorporate higher-order thinking skills into their teaching approaches. However, the analysis reveals challenges in terms of time constraints within the curriculum and the need for diverse assessment methods. The resistance to a shift from rote learning to analytical thinking suggests a broader need for professional development and a cultural shift within the education system. Saleh (2019) study also support this finding as he concluded that some social, cultural, and administrative barriers limited the effectiveness of this implementation. The varied responses of teachers to learning English highlight the diverse learning preferences and challenges within government school classrooms. Efforts to make lessons engaging and relevant are evident, but challenges persist, including language proficiency, limited exposure, and differing learning styles. The multifaceted nature of these challenges necessitates adaptive teaching strategies and on-going efforts to bridge gaps in student engagement.

Based on above analysis, critical thinking intervention was designed for experimental study, in this study which is quantitative in nature. This study comprised of one research question as follows; (i) Does critical thinking intervention affect students’ academic achievement in the subject of English at higher secondary level? To address these research questions, 4 null hypotheses were tested. The academic achievement was measured through an achievement test, before and after the intervention. The SATscale score before intervention, as shown in tables 4.1, 4.2, 4.3, 4.4, 4.5, 4.6 and 4.7 were

found to be almost identical as the analysis suggests that, before any intervention, there is no significant difference in the mean SAT scores. This implies that the pre-test was successful in equating the students and dividing them into experimental and control groups. These findings are consistent with Ramdass and Zimmerman (2011); Fatima (2021) study on developing self-regulation skills.

After intervention using the critical thinking intervention the students' academic achievement test (SAT) scores in English increased. The critical thinking intervention was effective in improving the experimental group's learning during the post-test. The improvement in academic achievement after intervention aligns with the results of Karbalaei (2012); Tiruneh et al. (2014); and Rivas et al. (2023). While the comparison of mean scores of control groups before and after intervention, in SAT and students' planning and goal setting (PGS), strategies (S), reflection (R) self-evaluation (SE), and self-regulation (SR) showed no significant difference as compared to experimental group as control group didn't receive any CT intervention or intervention in tables 4.23, 4.25, 4.26, and 4.27. It was confirmed from the findings that the improvement in student academic achievements and self-regulation abilities happened in experimental groups due to CT intervention.

In conclusion, the study provides comprehensive evidence supporting the efficacy of the CT intervention in enhancing students' critical thinking abilities, academic achievement in the subject of English at the higher secondary level. The positive outcomes align with and contribute to the prior academic findings, emphasizing the importance of integrating CT interventions in educational settings for holistic student development.

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