



Investigating The Role of Cognitive Flexibility in English Language Learning

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| ARTICLE INFO | ABSTRACT |
| Keywords: Cognitive Flexibility Among ESL Learners, Adaptive Learning Strategies, Perspective Taking, Language Switching | The present study is an attempt to probe the role of cognitive flexibility in English language learning, highlighting its significance as an emerging area of psycholinguistics. Cognitive flexibility refers to the ability to adapt thinking and behavior in response to new information, shifting contexts, or multiple perspectives. This skill is essential in problem-solving, decision-making, and creativity, all of which contribute directly to language acquisition. The research adopted a quantitative design, employing the Cognitive Flexibility Inventory (CFI) developed by Dennis and Vander Wal (2010) along with academic results in English courses. Data were collected from a sample of 100 English language learners at colleges and universities in Pakistan. The findings revealed a strong positive correlation between cognitive flexibility and English language performance. Learners with higher levels of Cognitive flexibility outperformed than their peers in the language components of grammar, comprehension, and vocabulary, demonstrating resilience and motivation in problem-solving tasks. This study fills a research gap by providing empirical evidence on the role of cognitive flexibility in English language learning contexts. The implications suggest that fostering flexible thinking can enhance English language pedagogy, curriculum design, and overall learning outcomes. |
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1. Introduction

1.1 Background of the Study

Cognitive flexibility is recognized as a vital component of executive function, enabling individuals to modify their thought processes, adapt to novel contexts, and respond to challenges with creativity and resilience. Scholars have long associated this

skill with decision-making, problem-solving, and creativity (Diamond, 2012; Dreu, Nijstad, & Baas, 2011). In educational contexts, cognitive flexibility plays an equally important role by allowing learners to switch between multiple perspectives, engage in critical thinking, and overcome linguistic or social barriers. The concept is particularly significant in second language learning/acquisition. English as a second language (ESL) learners frequently encounter unfamiliar vocabulary, complex grammatical structures, and diverse communicative situations. Cognitive flexibility helps them infer meanings from context, adjust to linguistic rules, and creatively apply knowledge across tasks. Spiro and Jehng (1990) emphasize those learners with higher flexibility handle unpredictable information more efficiently, enabling faster comprehension and improved performance in academic settings.

The neurological foundation of cognitive flexibility lies in the prefrontal cortex, where executive control enables task-switching and response inhibition (Bunge & Zelazo, 2006). This explains why flexible learners are often better at transitioning between their first languages (L1) and second language (L2), suppressing irrelevant linguistic interference, and adapting to dynamic learning contexts. Despite its significance, limited research has directly explored the relationship between cognitive flexibility and ESL learning. While studies highlight connections with bilingualism, creativity, and problem-solving (Greenberg, Bellana, & Bialystok, 2013; Kharkhurin, 2010), there is a lack of empirical work focusing specifically on how flexibility impacts English acquisition among learners in Pakistan. This study seeks to fill that gap by empirically testing the relationship between cognitive flexibility and English proficiency in ESL contexts.

Cognitive flexibility has been divided into many types. One of the most common flexibility is known as task switching flexibility. This type of flexibility helps the people to switch between different tasks which help them to come up with multiple creative solutions. According to (Miyake and Monsell, 2003), the power to switch between tasks, rules, or mental sets effectively is known as task-switching flexibility. Cognitive tests like the Wisconsin Card Sorting Test (Grant & Berg, 1948) and the Stroop Test (Stroop, 1935) are frequently used to determine it. This is a crucial decision-making function that allows people to think about multiple tasks at the same time which comes up with a number of solutions Monsell (2003).

The second type of flexibility is known as regulation-based flexibility. According to Müller & Zelazo (2002), this kind of flexibility entails flexible answers based on some particular rules, which plays a vital role in thinking and solving the problems related to any area of life. Zelazo & Müller (2002) established a connection between rule-based flexibility and children's decision making development. This type of flexibility has some rules and regulations. Autism spectrum disorders are associated with deficiencies in this type of flexibility (Ozonoff et al., 2004). The third type of flexibility is known as intentional flexibility. This kind of flexibility is essential in changing conditions. According to Posner and Rothbart (2007), Focus switching between various stimuli or mental images is referred to as intentional flexibility. Posner and Rothbart (2007) highlighted its function in cognitive control and self-regulation, connecting it to neuronal processes in the frontal cingulate cortex. It is essential for multitasking and adjusting to changing conditions.

1.2 Statement of the Problem: English language learners frequently face difficulties when managing unfamiliar vocabulary, complex grammar, or contextual interpretation.

Traditional approaches to ESL learning often emphasize rote memorization rather than adaptive problem-solving. However, the ability to think flexibly allows learners to generate multiple solutions, infer meaning from context, and adjust to new communicative demands. Despite the recognized importance of this skill, little research has been conducted on how cognitive flexibility directly influences English language acquisition. This study addresses this gap by examining the extent to which flexible thinking contributes to improved language learning outcomes.

1.3 Objectives of the Study

- To evaluate the association between cognitive flexibility and English proficiency among ESL learners.
- To analyze the impact of cognitive flexibility on resolving problems when encountering unfamiliar linguistic structures.
- To assess the function of cognitive flexibility in understanding context-based information during English learning.

1.4 Research Questions

1. To what extent does enhancing cognitive flexibility improve problem-solving abilities during English language learning tasks?
2. How does cognitive flexibility enable ESL learners to think about multiple options in challenging situations?
3. How does cognitive flexibility help ESL learners infer meaning from contextual information?

2. Review of Literature

Cognitive flexibility has gained prominence in cognitive psychology, neuroscience, and educational research for its role in adaptive thinking, problem-solving, and language learning. It refers to an individual's ability to shift perspectives, adjust strategies, and modify behavior when faced with changing circumstances or conflicting information (Diamond, 2013). This section reviews theoretical foundations, empirical studies, and research gaps, highlighting its significance in second language learning. The previous researches also show a relationship between cognitive flexibility and bilingualism. Based on these findings, one might hypothesize that bilingual individuals tend to have more cognitive skills compared to their monolingual peers. Monolingual students have less chance to see the situation from different perspectives because of their limited knowledge but as compare to them bilingual students contain the knowledge of two or more than two languages; therefore, they can solve the problems more efficiently as compare to the learners who have the knowledge of only one language. However, these studies did not clarify the underlying causes of these improved cognitive abilities. Are individuals with higher cognitive skills more likely to learn a second language, or does learning a second language actually contributed to the development of these skills? Additionally, the literature review highlighted that relatively few recent studies have specifically explored the connection between second language learning and one particular cognitive skill (Bialystok 2009).

Over the past ten years, researchers explore the relationship of cognitive flexibility with the acquisition of second language learning. The studies explore how creative thinking helps the ESL learners to acquire a language in a more creative way. Creativity is defined as the ability to generate and produce new ideas, solves the

problems of everyday life and thinks about multiple solutions of a specific problem (Romero, Hyonen, Barbera 2012). Research on creativity is crucial part of human intelligence and there is still insufficient work on it (Meera and Remya 2010). Pishghadam et al. (2011) specifically pointing out the lack of studies on creativity in the context of second language learning. Creative thinking plays a vital role in learning English as a second language. There are many researches that have been done on the role of inventive thinking in the acquisition of English language. Studies have found a positive correlation between both of them. Research by Uteubayeva, Kultanova, and Pastushenko (2012) and Pishghadam, Khodadady, and Zabihi (2011) discovered a link between exposure to second languages and innovative thinking. According to Uteubayeva et al. (2012), learning a second language may even be based on creativity. Additionally, studies by Hajilou, Yazdani, and Shokrpour (2012), Feuer (2011), Meera and Remya (2010), Akinwamide and Adedara (2012), and Cross (2012) indicated that creativity had a favorable impact on second language acquisition. The students who are more creative can learn English more quickly as compare to those who are less creative. Creativity comes from flexible thinking and therefore, all of them are related to each other. So the learners with more flexible thinking and creativity have more ability to solve the problems related to language learning.

Luk (2013) and Schultz (2011), on the other hand, highlighted the importance of language creation in multilingual cultures. Additionally, research by Leikin (2012) and Kharkhurin (2010) indicated that flexibility might foster creativity. Furthermore, Sehic (2016) investigated whether students who had successfully finished a college-level second language course outperformed those who had not in terms of fluency, flexibility, originality, and elaboration as measured by the Alternate Uses Test. The study involved undergraduate students of both sexes in the United States. A MANOVA test revealed that students who took a second language course performed better across all four creative thinking areas. The only area where there was a statistically significant difference was in flexibility, where students who had taken a second language course performed better than those who had not (Sehic, 2016) conducted studies that shed light on the connection between learning a second language and the ability to think creatively. To further understand how acquiring a second language affects creative thinking, however, more study is required using a variety of individuals, research designs, and research methodologies.

Early cognitive scientists, including Piaget (1950), emphasized flexibility in developmental stages, particularly when children transitioned from concrete to abstract reasoning. Spiro and Jehng (1990) later formalized Cognitive Flexibility Theory, which argues that learners with flexible thinking can restructure knowledge, transfer learning across contexts, and deal with complex, ill-structured domains. Similarly, Miyake et al. (2000) identified flexibility as a core component of executive functions, alongside working memory and inhibitory control. Neuroscientific research supports these views, linking cognitive flexibility to the prefrontal cortex (Bunge & Zelazo, 2006). Studies demonstrate that task-switching, response inhibition, and perspective-taking are mediated by neural networks, allowing individuals to adapt quickly. This neurological basis explains why flexible learners excel in contexts such as language acquisition, where switching between L1 and L2 is essential (Cepeda, Kramer, & Gonzalez de Sather, 2001). Several scholars have demonstrated that flexible thinkers are better at problem-

solving and decision-making. Scott and Bruce (1995) linked flexibility to innovative decision strategies, while Bonanno and Burton (2013) showed its role in coping with stress and adversity. Rosen and Engle (1997) further emphasized its educational importance, suggesting that learners with greater flexibility adapt more easily to challenging tasks and achieve better academic outcomes. Creativity and cognitive flexibility are closely related. Dreu, Nijstad, and Baas (2011) demonstrated that flexible individuals generate multiple solutions in complex tasks. Kharkhurin (2010) connected bilingualism with creativity, arguing that switching between languages fosters flexible thought processes that enhance innovation. Research by Uteubayeva, Kultanova, and Pastushenko (2012) also highlighted that exposure to multiple languages strengthens creativity and problem-solving ability.

Language acquisition requires constant adaptation, particularly when learners face unfamiliar vocabulary, grammar, or communicative contexts. Cognitive flexibility enables ESL learners to: Switch between linguistic systems (Bialystok & Martin, 2004). Inhibit interference from their L1 while using English (Kroll et al., 2015). Use context to infer meaning (Spiro et al., 1988). Apply multiple problem-solving strategies to linguistic challenges (Ellis, 2005). Research also suggests that bilingual individuals possess stronger cognitive flexibility than monolinguals. Greenberg, Bellana, and Bialystok (2013) found that bilinguals maintain flexibility even in older age, showing resilience in task-switching and attention control. This supports the view that learning multiple languages fosters adaptability and executive control. Research on academic achievement also reveals a strong link between flexibility and success. Toraman et al. (2020) found that students with higher flexibility achieved better GPAs and adopted deep learning strategies, while less flexible learners relied on rote memorization. Schommer-Aikins and Easter (2018) reported that flexibility reduces procrastination and enhances time management in digital learning environments.

2.1 Research Gap

Although literature supports a strong connection between cognitive flexibility, creativity, and bilingualism, few studies directly examine its role in English language learning, particularly in ESL contexts in Pakistan. Most existing research explores bilingual advantages or cognitive theories but lacks empirical focus on how flexibility influences grammar, comprehension, and vocabulary learning. This study addresses that gap by empirically analyzing the correlation between cognitive flexibility and English proficiency among Pakistani learners.

3. Research Methodology

3.1 Research Design

The study employed a quantitative, correlation design to investigate the relationship between cognitive flexibility and English language learning. The independent variable was cognitive flexibility, measured through the Cognitive Flexibility Inventory (CFI), while the dependent variable was English language performance, measured through exam scores. In quantitative research, the researcher used a questionnaire method to analyze the function of cognitive flexibility in English language learning. In order to enable objective measurement and statistical analysis of variables, the researcher used quantitative research methodologies in this thesis to gather and examine numerical data. In particular, the researcher's main method of analyzing quantitative data is descriptive analysis. By describing the fundamental characteristics

and trends in the data using statistical methods like mean, median, standard deviation, frequencies, and percentages, descriptive analysis offers a concise synopsis of the dataset. The researcher can investigate central tendencies, variability, and dispersion with this method, which serves as the foundation for analyzing the broad trends and revelations pertinent to gain study goals. Because quantitative research focuses on quantifiable data, the outcomes are more reliable and generalized (Creswell, 2014). Descriptive statistics are a crucial first step in understanding the data's structure and guiding further analytical processes. By employing this method, the researcher intends to provide a comprehensive examination of the dataset and highlight any salient characteristics that could influence the study's conclusions.

3.2 Participants and Sampling

The study involved 100 ESL learners enrolled in colleges and universities in Pakistan. Both male and female students participated. A purposive sampling technique was used to ensure that only students actively engaged in English language learning were included.

3.3 Research Instruments

The primary tool was the Cognitive Flexibility Inventory (CFI), developed by Dennis and Vander Wal (2010). This 20-item, 7-point Likert scale instrument measures individuals' ability to perceive difficult situations, consider alternative perspectives, and infer meaning from context. It has demonstrated high validity and reliability across educational and psychological contexts. For measuring English language learning, students' academic exam results in English subjects (grammar, comprehension, writing, and linguistics) were collected with institutional permission. These results provided an objective measure of performance to correlate with CFI scores.

Participants were briefed about the purpose of the study and provided informed consent. The CFI questionnaire was distributed face-to-face to ensure clarity and accuracy of responses. Academic results were collected from institutional records, ensuring confidentiality. Data were compiled and prepared for descriptive and correlation statistical analysis.

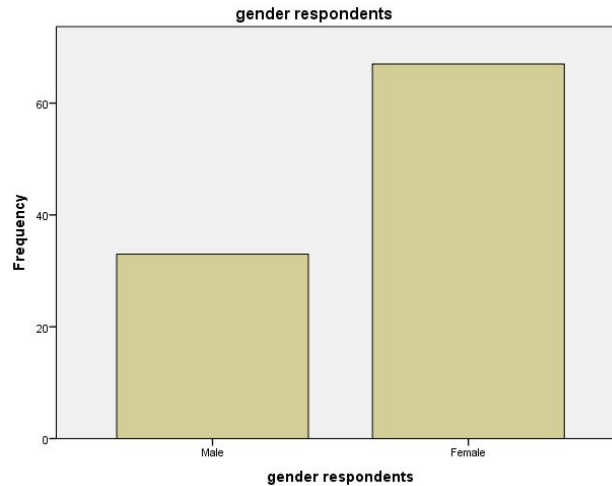
3.4 Results

Table 1.1

Gender of respondents

| | | Frequency | Percent | Valid Percent | Cumulative Percent |
|--|--------|-----------|---------|---------------|--------------------|
| | Male | 33 | 33.0 | 33.0 | 33.0 |
| | Female | 67 | 67.0 | 67.0 | 100.0 |
| | Total | 100 | 100.0 | 100.0 | |

Figure 1.1

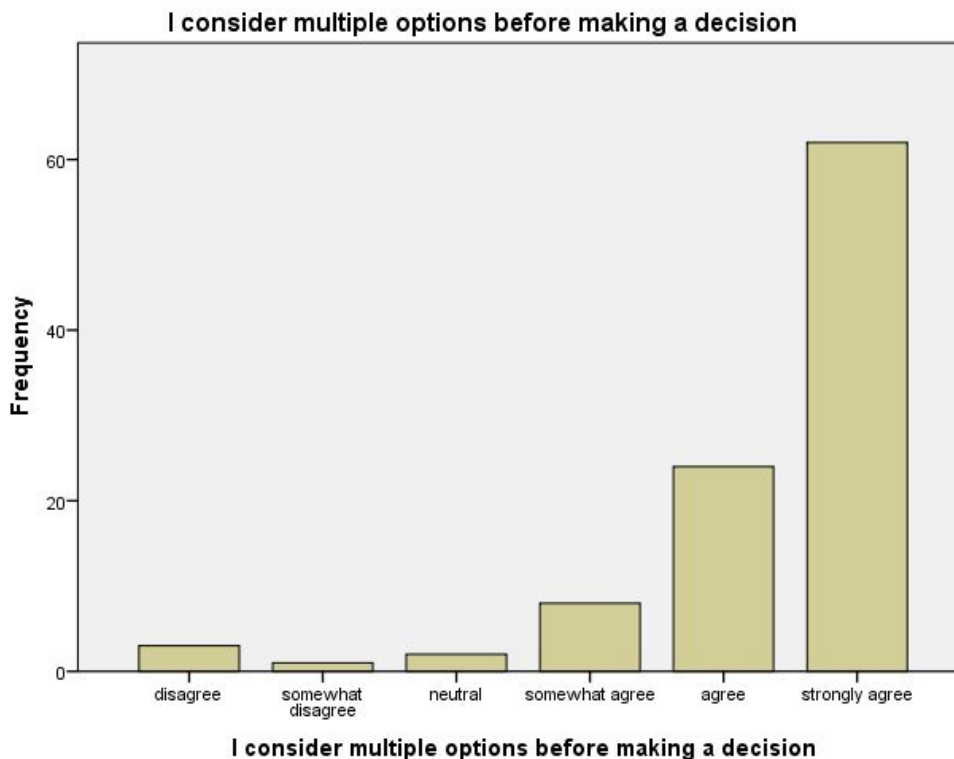


The frequency, percentage, and cumulative percentage for males and females are displayed in the table, which breaks down the sample population by gender. Out of the 100 people in the sample, 33 are men (34.0%) and 67 are women (67.0%). There are no missing or excluded entries, indicating that the data is completely legitimate in both the "Percent" and "Valid Percent" columns. The cumulative percentage for males is 33.0%, while for females, it is 100.0%. This indicates that 67% of the sample is female once males are taken into consideration. The distribution shows that there are more females than males in the sample. The data shows a gender split of 67% female and 33% male, and it seems to be well-distributed and valid overall with no missing numbers.

Table 1.2

| Considering options before taking a decision | | | | | |
|--|-------------------|-----------|---------|---------------|--------------------|
| | | Frequency | Percent | Valid Percent | Cumulative Percent |
| | Disagree | 3 | 3.0 | 3.0 | 3.0 |
| | somewhat disagree | 1 | 1.0 | 1.0 | 4.0 |
| | Neutral | 2 | 2.0 | 2.0 | 6.0 |
| | somewhat agree | 8 | 8.0 | 8.0 | 14.0 |
| | Agree | 24 | 24.0 | 24.0 | 38.0 |
| | strongly agree | 62 | 62.0 | 62.0 | 100.0 |
| | Total | 100 | 100.0 | 100.0 | |

Figure 1.2



Descriptive Statistics; of the 100 participants, 67% were female and 33% male. The majority of learners rated themselves positively in self-perception of flexibility: 81% agreed they were good at “sizing up situations.” A majority reported considering multiple options before deciding. Most participants indicated they sought extra information and adopted others’ perspectives in problem-solving. While some respondents reported stress as a factor affecting decision-making, flexible learners were less likely to feel helpless or clueless in difficult circumstances. A strong positive correlation was found between CFI scores and English exam results. Learners with higher flexibility: Performed significantly better in grammar, comprehension, and vocabulary. The findings of this study confirm the significant role of cognitive flexibility in English language learning. Learners with higher flexibility demonstrated better academic performance in grammar, comprehension, vocabulary, and writing. These results highlight that flexibility is not only a psychological construct but also a practical tool for enhancing second language acquisition.

The study aligns with Cognitive Flexibility Theory (Spiro & Jehng, 1990), which emphasizes the ability to restructure knowledge in multiple ways. Flexible learners in this research used contextual cues, adjusted strategies, and shifted perspectives, supporting the theoretical claim that adaptability enhances learning outcomes. The results also support Executive Function Theory (Miyake et al., 2000), which identifies flexibility as central to switching between tasks and inhibiting irrelevant information. Learners with high CFI scores displayed stronger capacity to suppress L1 interference while using English, echoing findings from Bialystok and Martin (2004). In agreement with Kharkhurin (2010), who argued that bilingualism enhances creativity and flexibility, this study demonstrates that ESL learners with higher flexibility were more creative in

problem-solving tasks, inferring meanings and generating solutions with ease. Similarly, the findings resonate with Adesope et al. (2010), who reported that flexible learners adapt more effectively to multimedia environments, and Fadda (2012), who linked flexibility with speed and efficiency in problem-solving. While past studies have mostly explored bilingual advantages in general, this research contributes uniquely by empirically linking cognitive flexibility with English language performance in Pakistan. By correlating CFI scores with academic results, the study offers direct evidence that flexibility is a measurable predictor of ESL achievement.

Table 1.3

| | Frequency | Percent | Valid Percent | Cumulative Percent |
|-------------------|-----------|---------|---------------|--------------------|
| strongly disagree | 6 | 6.0 | 6.0 | 6.0 |
| Disagree | 21 | 21.0 | 21.0 | 27.0 |
| somewhat disagree | 45 | 45.0 | 45.0 | 72.0 |
| Neutral | 5 | 5.0 | 5.0 | 77.0 |
| somewhat agree | 9 | 9.0 | 9.0 | 86.0 |
| Agree | 2 | 2.0 | 2.0 | 88.0 |
| strongly agree | 12 | 12.0 | 12.0 | 100.0 |
| Total | 100 | 100.0 | 100.0 | |

Figure 1.3



This bridges a gap in psycholinguistics, particularly within South Asian educational contexts where such research is limited. Students' perceptions of cognitive flexibility and

their ability in learning English are clearly related, according to the data gathered for this study. Based on their answers to Dennis and Vander Wal's (2010) Cognitive Flexibility Inventory (CFI), students were categorized based on how much they valued cognitive flexibility in their educational journey. A noteworthy trend surfaced when these answers were contrasted with their final-term English exam results. Approximately 80% of students who believed that cognitive flexibility were an important component of learning performed better on their English language tests. These pupils tended to do better in important domains including grammatical accuracy, reading comprehension, and vocabulary usage. Those who did not value cognitive flexibility as much, on the other hand, typically performed worse. This result implies a favorable correlation between good English language acquisition and appreciating cognitive flexibility. Students who understand the value of mental flexibility, receptivity to new ideas, and the capacity to change viewpoints seem to be better equipped to handle the difficulties of learning a new language. These findings highlight the possible advantages of encouraging cognitive flexibility in learning environments in order to improve language acquisition results. On the other hand, students who did not believe that cognitive flexibility played a significant role in their learning typically scored lower. This disparity implies that students, who respect flexibility, take into account different viewpoints, and switch between different approaches typically do better when learning a second language. These results are consistent with previous research showing that cognitive flexibility is an essential component of successful language learning.

Cognitively flexible people are abler to adapt to new linguistic circumstances and use different communication techniques, which improves language competency, claim Martin and Rubin (1995). In the same way, Spiro et al. (1988) underlined that cognitive flexibility helps students integrate and rearrange intricate information structures, which is a crucial ability for second language acquisition. Additionally, cognitive flexibility helps students deal with ambiguity, a typical problem in language learning (MacIntyre & Serroul, 2015). Therefore, the findings of this study support the notion that encouraging cognitive flexibility could be a useful teaching strategy in language instruction. Students' language learning outcomes and general academic performance may be improved by encouraging them to become more thoughtful and mentally flexible. Overall, the findings offer empirical evidence in favor of the positive correlation between cognitive flexibility and performance in learning English, indicating that students who actively value and employ flexible thinking are more likely to succeed academically.

In language learning situations where flexibility is essential, students with high cognitive flexibility may have an edge since they frequently exhibit an enhanced capacity to adapt to various teaching philosophies and classroom dynamics. According to Scott (1962), cognitive flexibility allows people to rearrange their mental models in reaction to fresh data or modifications in their surroundings. This flexibility makes it easier for language learners to accept the uncertainties that are frequently associated with learning a second language, experiment with various learning techniques, and absorb feedback. Less cognitively flexible students, on the other hand, could find it difficult to apply concepts they have learnt in new or unfamiliar contexts and struggle with strict learning patterns, which can have a detrimental effect on language usage and retention. Additionally, learners' met cognitive awareness—their capacity to observe, assess, and control their own learning processes—seems to be improved by cognitive flexibility. This

is especially crucial for language learners, who must regularly evaluate their understanding, pinpoint their weak points, and select the best methods to get past linguistic obstacles. Studies by Zimmerman (2002) and Flavell (1979) highlighted the importance of met cognitive abilities for autonomous and effective learning.

3.5 Implications

Cognitive flexibility enhances motivation and resilience in challenging English tasks. Learners with higher flexibility can approach unfamiliar vocabulary and grammar more creatively. Developing this skill helps students adapt to dynamic learning contexts and apply strategies across different tasks. Instructional methods should encourage flexible thinking, such as debates, group discussions, and problem-solving activities. Teachers can use multimedia and contextual approaches to strengthen adaptability. Classroom environments should emphasize multiple perspectives, encouraging learners to think beyond rote memorization.

Curriculum design should integrate tasks that promote adaptability, creativity, and multi-perspective learning. Education policy should highlight critical thinking and cognitive flexibility as essential learning outcomes, alongside language proficiency. National programs for ESL should include training modules to foster flexible problem-solving and decision-making.

3.6 Limitations of the Study

While the study provides valuable insights, certain limitations must be acknowledged: Sample Size: Limited to 100 students, which restricts generalizability. Geographical Context: Conducted in Pakistani institutions; findings may vary in other cultural or educational settings. Research Design: Exclusively quantitative; qualitative insights (interviews, observations) could provide richer understanding.

Focus: Limited to ESL learning; cognitive flexibility may influence other academic areas not covered here. Based on these limitations, future studies should: Expand the sample size across multiple institutions and regions for broader validity. The study employ mixed-methods approaches, combining quantitative and qualitative data, to capture deeper insights into how learners apply flexibility in real-time, explore the impact of flexibility on specific ESL skills such as speaking, writing, or pronunciation, Conduct cross-cultural comparisons to examine how flexibility functions across different linguistic and cultural contexts and investigate interventions and classroom strategies that actively enhance cognitive flexibility among ESL learners.

4. Conclusion

The research study supports the view that cognitive flexibility is a strong predictor of success in English language learning. Learners with higher flexibility not only achieve better academic results but also demonstrate adaptability, resilience, and creativity in tackling linguistic challenges. The findings reinforce established theories of flexibility while contributing new empirical evidence from Pakistan, an under-researched context in psycholinguistics. By highlighting the connection between flexible thinking and ESL outcomes, this study underscores the need for teaching strategies, curricula, and educational policies that foster adaptability. Beyond language classrooms, the research emphasizes cognitive flexibility as a lifelong skill essential for problem-solving, decision-making, and professional growth. In conclusion, fostering cognitive flexibility can transform the way learners approach English as a second language, ultimately leading

to improved academic performance, enhanced motivation, and better preparedness for global communication.

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