

## LANGUAGE LEARNING AS A COGNITIVE ENHANCEMENT STRATEGY AMONG KURDISH EFL LEARNERS IN CHARMO UNIVERISTY, CHAMCHAMAL, KURDISTAN REGION, IRAQ

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### Abstract

The current mixed-methods study focuses on cognitive enhancement strategies through Structured English as a Foreign Language (EFL) learning among fourth-year students at Charmo University, Chamchamal, Iraq. The study considers the implications consequent to the cognitive flexible triggering of problem-solving, resilient psychologically from the translated memorized content, and acquisition of a foreign language. The study revealed quantitative results of strong positive interrelations of language learning with cognitive enhancement ( $r = 0.614$ ,  $p < 0.05$  medium effect), adaptive cognitive functioning ( $r = 0.643$ ,  $p < 0.05$ ) and resilience psychologically ( $r = 0.597$ ,  $p < 0.05$ ). The qualitative analysis on thematic analysis and semi-structured interviews illustrated the students' self-reported mental flexibility, creativity, and cultural awareness, as well as the positive adjustments from the anxiety. There are no significant differences in gender ( $p > 0.05$ ). The study principally highlighted the cognitive advantage of advanced EFL learning, countering claims of diminished bilingual advantage over time. Integration of culturally relevant language materials into higher education curricula will serve as cognitive training, considering the scarce studies on the neuropsychological benefits of language learning within the context of developing countries.

**Keywords:** *brain training; cognitive flexibility; EFL learners; language acquisition; neuroplasticity; psychological resilience*

### 1. Introduction

Neuroplasticity occurs throughout the lifespan as well as at different levels (Hofman, 2014). The most important focus for cognitive and psychological development is the acquisition of different languages. There is a growing literature focusing on the cognitive benefits of bilingualism (Bialystok et al., 2012; Costa & Sebastián-Gallés, 2015) with very little research looking into structured English as a Foreign Language (EFL) instruction in developing countries as a purposeful neuropsychological development tool.

When a person is learning a new language, the learning process involves more than the acquisition of vocabulary and grammar. A more complex cognitive system is involved, including aspects of memory, attention, executive functioning, and emotion regulation (Kennedy, 2006). This complex integration is what makes learning a new language a comprehensive cognitive engagement intervention, and one which is particularly

appropriate in the higher educational setting to build substantive cognitive development evidence.

Acquiring a new language involves learning new systems of communication, new cultures, and new environments of interaction (Shaddad & Jember, 2024). The learner has to acquire a new language's phonetics, grammar, expressions, language use, and culturally based pragmatics (Council of Europe, 2018). The learner has to use cognitive flexibility, which involves the ability to shift and reorganize different parameters of mental constructs, suppress distractors, and elaborate on contextual knowledge. The tasks culminate in providing a rich cognitive environment which promotes formation and strengthening of neural pathways, and brain plasticity.

Although the cognitive benefits of bilingualism have been thoroughly documented, there are still important gaps to fill. Given the predominance of research focused on simultaneous or early sequential bilingual cases, writings on adult EFL learners in academic settings are particularly scarce. Moreover, the controversial findings regarding the cognitive benefits of bilingualism on a global scale (Milczarski et al., 2024; Berggren et al., 2019) underline an important gap in the study of situational factors that might affect cognitive functions. Finally, the research on the neuropsychological aspects of language learning in Chamchamal, where English is an academic rather than a societal language, is practically non-existent.

This study attempts to merge one of the most established models of cognitive psychology, Baddeley's Working Memory Model, which associates language learning with the strengthening of phonological loops, the visuospatial sketchpad, and overall executive functions of the brain, and Vygotsky's Sociocultural Theory, which posits that language serves as a tool for cognitive development through social interaction and cultural resources. From this perspective, EFL learning functions as a cognitive exercise and as a sociocultural tool for enhanced mental development.

This study assesses whether learning English as a foreign language at the advanced level improves the cognitive functions (memory, attention, problem-solving) and cognitive flexibility and psychological resilience of advanced-level EFL Kurdish university students and whether these effects vary by gender. The research answers an important theoretical question. At advanced proficiency level, does learning a foreign language systematically and cognitively strengthen the functions of the brain? From an applied perspective, the results provide an education policy language program integration as cognitive flexible training in higher education curriculum.

Building upon the theoretical foundations and existing research, this study seeks to further investigate the relationship between language learning and cognitive as well as psychological development. The inquiry is guided by the following research questions:

1. How does language learning influence cognitive abilities such as memory, attention, and problem-solving skills?
2. What are the perceived effects of language acquisition on cognitive flexibility and adaptability?
3. What are the psychological advantages of language learning, explicitly enhancing self-assurance and reducing stress?
4. Is there a statistically significant difference between students' responses based on gender?

By addressing these questions, the present study aims to contribute to a deeper understanding of the cognitive and emotional dimensions of language learning and to provide empirical insights that may inform pedagogical practices and future research in the field of applied linguistics.

## 2. Literature Review

### 2.1 Cognitive Mechanisms: Memory and Executive Function

Language acquisition engages complex neural networks requiring sustained cognitive effort (Kennedy, 2006). Beyond the simple knowledge of additional lexicons, the process of bilingualism entails the constant intertwining of the multiple systems of the languages a person speaks, a phenomenon which requires even greater executive control, that is, the ability to plan, inhibit, and flexibly shift (Bialystok, 2001). This constant linguistic juggling strengthens the brain's executive function networks.

As for the neurobiological side, diffusion tensor imaging has shown that bilingualism augments the efficiency of the white matter tracts of the areas associated with language control and working memory (Hämäläinen et al., 2017). These structural brain changes correlate with superior performance on tasks requiring cognitive flexibility and attentional control. Although the focus of Bialystok et al. (2012) is on the benefits in executive control, one should be careful in extending such findings to non-linguistic areas due to questions surrounding the specificity of the tasks used and the criteria for the selection of study participants.

Morales et al. (2012) suggests the possibility that bilinguals are more proficient than monolinguals at working memory tasks because of the captivating and controlling functions of frameworks relating to dual linguicism. Milczarski et al. (2024) intends to investigate the applicability of these advantages to general cognitive reflection and numeracy. They claim that the advantage observed to them is per task. This tension suggests the need to examine and better document cognitive domains that will benefit the most from additional languages.

### 2.2 Neurobiological Evidence: Brain Plasticity and Structural Changes

Learning a language may result in brain neuroplasticity. Li et al. (2014) examined the cognitive and structural changes within working memory, control and language areas of the brain and concluded that bilinguals experience increases in the density of grey matter. These changes in brain structure correlate with improvements in the rate of information processing and control of attention. Mårtensson et al. (2012) observe that intensive language training activates both brain hemispheres, particularly prefrontal regions governing higher-order thinking and executive control.

The extent to which these changes are maintained and the changes that are received are conditional to factors such as age of acquisition, proficiency level, frequency of use, and learning context (Gathercole & Thomas, 2009). The "critical period hypothesis" (Johnson & Newport, 1989) claims that parts of childhood are more plastic and learning can be achieved more readily, yet adults, even with structured lessons, can still learn a language cognitively and in other ways, albeit through different cognitive processes and neural mechanisms.

### 2.3 Emotional and Social Dimensions

Learning a new language involves cognitive work, but it also triggers social and emotional development. According to Dewaele and Nakano (2012), multilingual people,

compared to monolinguals, showed more empathy and greater cultural sensitivity. Learning different languages enhances different culturally flexible social styles, greater intercultural social skills, and increased social and psychological integration needed to relate to people from different parts of the globe.

Psychological well-being hinges on successful communication in a foreign language. Self-efficacy and self-esteem increase in multicultural educational and professional environments, and mastery of languages is viewed as a significant adaptive and intellectual competence (Dewaele & MacIntyre, 2016). Self-efficacy and self-esteem growth are also true in many multicultural educational and professional situations. On the other hand, self-esteem also comes with language anxiety, and practices that promote anxiety need to be avoided to enhance participation. Zhao (2023) showed anxiety and high performance demands lead to disengagement from the task. Thus, it is essential to promote a low-anxiety instructional environment.

## 2.4 Related Studies

Sarikaya and others (2014) showed in their longitudinal research that compared to monolinguals, bilingualism gives the advantage of delaying the onset of dementia symptoms by 4 to 5 years. This suggests that the use of languages and the cognitive reserves it provides may help in protecting the brain from age-related decline.

Kovács and Mehler (2009) claim that infants that are exposed to two languages from birth achieve executive functions in advance. Their work indicated that at seven months of age, bilinguals surpassed monolinguals in tasks involving cognitive flexibility. Their research showed that bilinguals outperformed monolinguals regarding cognitive flexibility tasks at seven months.

Cummins (2000) attempted to analyze the complexities of multilingualism and cognitive flexibility. He mentioned that multilingual people tend to think divergently and possess flexible cognitive problem-solving skills. This is likely due to the ability to switch and think in different cultural and linguistic frameworks. It is this cognitive scaffolding that enables individuals to approach a problem from numerous perspectives (Andleeb et al., 2023).

The study done by Yang (2023) where cognitive flexibility, working memory, and executive functions were measured in 200 multilingual individuals between the ages of 20 and 50, gave further proof of the cognitive benefits of language practice. There was a notable 23% increase in cognitive flexibility over the 6 months along the dimensions stated. This reiterates the point that language learning and neural stimulation of various other cognitive functions go hand in hand.

Channa et al. (2015) analyzed how the metacognitive strategies of planning, monitoring, and evaluating aid the improvement of reading comprehension. It was concluded that, in order to foster critical reflective engagement with a text, and thus enhance the reading skills, teachers must step in and guide learners.

Saito (2022) investigated the influence of second language acquisition on auditory processing in a study that involved 300 individuals. He found that after three months of immersion in a language, particularly with phonetic discrimination, respondents showed 30% improvement in response times, fewer errors, and overall auditory processing improvement. This illustrates how language learning serves as auditory cognitive training.

In the study carried out by Degirmenci & Yavuz (2024), the link between emotional intelligence and success in learning a language was analyzed among university EFL students. Though the study did not identify emotional intelligence as a significant widespread

influencer, the findings suggested emotionally intelligent contextual influences, alongside other cognitive and non-cognitive variables, that are likely to be definitive in determining the language proficiency level attained.

In their study, Costa & Sebastián-Gallés (2015) address how cognitive processes and language learning are influenced by bilingualism. They identify two central elements. Bilinguals are exposed to each language for a substantially shorter time compared to a monolingual's exposure to a single language. Bilinguals also require more vigilant cognitive control and inter-system monitoring. These two elements are likely to enhance the cognitive overload at each stage of the bilingual process, subsequently improving the executive control modules within the system.

Overall, the studies offer cognitive training as a plausible effect of learning a language, although the learner characteristics, quality of instruction, proficiency, and sociocultural context do shape the extent of the impact. The present study adds to this body of work with advanced EFL learners in a developing region, and possible sustained language study at this high proficiency level and its potential cognitive and psychological dividends. In contrast to what is stated above, it is also important to claim that not all research supports universal bilingual cognitive advantages. For example, Berggren and colleagues (2019) carried out a meta-analysis where they found no conclusive evidence that any language training increases cognitive skills in the general domain, particularly spatial and long-term memory. Likewise, Milczarski et al. (2024) assert that there is no foreign language impact on cognitive reflection, which weakens the practical assumptions of language learning and the purported benefits to executive functions.

These contradictions likely stem from methodological variations including sample characteristics (simultaneous vs. sequential bilinguals; child vs. adult learners), proficiency levels, assessment tools, and contextual factors. Intrinsic motivation and the real use of the language are, according to MacIntyre & Blackie (2012), factors that mediate the learning outcome. That implies cognitive advantages may arise not solely from bilingualism, but the quality and context of language use.

### **3. Research Method**

#### **3.1 Research Design**

A convergent parallel mixed-methods design was implemented to gain a more comprehensive understanding of the psychological and cognitive consequences of language acquisition. This design included qualitative semi-structured interviews and quantitative surveys. The quantitative aspect was instrumental in evaluating the correlation between cognitive examination results and language learning results, while qualitative data was used to provide a robust contextual narrative regarding the learners' experiences and self-described strategies.

#### **3.2 Participants**

There were 55 advanced EFL students (12 male, 43 female) from the English Language Department at Charo University, Chamchamal, Kurdistan Region, Iraq. Participants were fourth-year students (seventh semester) with about 3.5 years of intensive English training, which placed them at higher levels of proficiency. This purposive sample aimed at understanding the cognitive benefits for learners who have crossed the intermediate stages of language study. With a sample size of 55, the study is exploratory, and the findings should be taken as pilot studies, with caution in terms of generalizability.

Participants were approached and recruited as active enrolled students for the study through in-class visits.

### **3.3 Ethical Considerations**

Before the commencement of the study, ethical clearance was sought from the English Department Head. Participants were provided with information sheets explaining the study and its procedures, including possible risks and benefits. Moreover, participants were sent the questionnaire under the condition of anonymity, and confidentiality was guaranteed. Participants were made aware of their right to withdraw from the study at any time and without any consequence.

### **3.4 Data Collection Instruments**

#### **3.4.1 Quantitative Instrument**

For quantitative data, a structured questionnaire containing 16 Likert-scale questions (1=Strongly Disagree to 5=Strongly Agree) was developed. The questionnaire was divided into five sections.

- Language Learning Experience (3 items): Learning background, time and languages learned, and preferred methods. E.g., "I have consistently engaged in language learning activities over the past three years."
- Cognitive Enhancements (4 items): Respondents' memory and reasoning retention. E.g. "Learning English has noticeably improved my ability to remember and recall information."
- Creativity and Mental Flexibility (3 items): Impact of learning a language on creative and flexible thinking. E.g., "Language learning has enhanced my ability to approach problems from multiple perspectives."
- Psychological Impact (4 items): Assessing the respondent's emotional and psychological state, including levels of stress and self-esteem which were affected by learning the language. Example: "Learning a new language has increased my self-confidence in academic and social situations."
- General Perception (2 items): overall perceptions of the cognitive utility of the language learned. E.g., "I would recommend language learning to others as an effective brain training exercise."

#### **3.4.2 Qualitative Instrument**

The five questions guiding the semi-structured interview were designed to help the participant discuss cognitive changes, problems they faced, creative development, cultural awareness, and overall perceptions of cognitive development. Using open-ended questions allowed the researchers to gather qualitative data.

### **3.5 Validity and Reliability**

For content validity, three faculty members from the English and Special Education Departments reviewed the questionnaire. They assessed the validity in terms of the dimensions of comprehensiveness, relevance, and clarity. The revision of the questions and their structures were based on the feedback as they were rephrased (see appendix A). Selected English Department students were used in a pilot study for instrument comprehension and reliability testing. They concluded reliability testing with a Cronbach's alpha of ( $\alpha = 0.78$ ). This suggested reasonable internal consistency.

### **3.6 Data Analysis**

#### **3.6.1 Quantitative Analysis**

Data migrated from the printed questionnaire to SPSS for the questionnaire. The quantitative data analysis included: 1. Descriptive statistics: frequencies and percentages provided a summary of the demographic characteristics. 2. Inferential Statistics: Pearson's correlation for the analysis of Research Questions 1 to 3, which were the relationships between the language learning experience and the cognitive and psychological outcomes. - Independent samples t-tests for Research Question 4 which analyzes the male and female responses where the normality (Shapiro-Wilk test) and homogeneity of variance (Levene's test) assumptions were met. - Chi-square test was used to analyze the relationships between language learning and the cognitive gains. - ANOVA test was used to analyze variances across proficiency levels (not reported because the sample was homogeneous). The p-value was set to 0.05 in order to determine statistical significance. The practical significance was indicated with effect sizes (Cohen's d for t-tests; r for correlations).

#### **3.6.2 Qualitative Analysis**

Interview responses underwent thematic analysis following Braun and Clarke's (2006) six-phase approach: familiarization, coding, theme identification, theme review, theme definition, and report writing. Codes were systematically organized into themes representing shared patterns in students' cognitive experiences, challenges, and strategies. (See Appendix B for qualitative and quantitative data).

## **4. Results and Discussion**

### **4.1 Qualitative Findings: Thematic Analysis**

Qualitative outcomes of semi-structured interviews elucidate the contextual framework of the correlations in the quantitative data. Specifically, the interviews detail the ways in which heterogeneous students' language learning informs the cognitive and psychological dimensions of their experiences.

#### **Theme 1: Enhanced Cognitive Abilities Through Language Learning**

Students, for the most part, were positive about their experiences learning a language, especially in the cognitive domain with respect to the enhancement of the various mechanisms of memory, attention, and problem-solving. Many interviewees reported a heightened "mental power" in relation to word retrieval and closure. This suggests, at least, the perception of a positive correlation of active language learning and cognitive transformation. The representative quotes: "Since I started learning English seriously, I notice I can remember things better, not just in English but in my other subjects too. My mind feels sharper."

Some students within the minority, referring to the cognitive domain, reported challenges of word retrieval and pausing in conversation. This recognition of the cognitive challenges somewhat hints at the stagnation of cognitive development and the challenges of practice.

#### **Theme 2: Observable Cognitive Improvements Over Time**

Students focused attention and problem-solving were triggered in their learning of new vocabulary. Many students reported the mastery of vocabulary and the crossing of idioms as significant learning moments. One student observed, "In the second year, I

remember finding phrasal verbs really challenging, but I now understand them quickly and can use them creatively.”

These students described significant mental effort, interwoven with their practice, to build fluency as a comprehension level and a native speaker, confronting described challenges.

### **Theme 3: Overcoming Challenges Builds Mental Flexibility**

Common challenges included fast-paced native speech, limited practice opportunities, and accent comprehension difficulties. Students employed strategies such as repeated listening, intensive practice, and independent research to overcome obstacles.

Crucially, most students mentioned the challenges. In language learning, the problem-solving and learning that is required is described as cognitive flexibility. As one participant explained: "At first, I felt frustrated when I couldn't understand movies in English, but pushing through that frustration taught me patience and made me more adaptable in other areas of my life."

This finding exemplifies theoretical work on resilience and emotional regulation. Part of the cognitive benefits of learning the languages come from the ability to cope with learning the languages and the cognitive benefits from learning the languages come from the effort to cope with the frustration and to work and keep the effort into the learning the languages (Dewaele & MacIntyre, 2016).

### **Theme 4: Enhanced Creativity and Cultural Awareness**

Most participants focused on the positive impact of languages on learning and encouraged creativity and the value of learning from different cultures and different perspectives. Examples provided by the students revealed the understanding and appreciation of different views, the comprehension of culturally-embedded idioms, and meaningful engagements with multicultural contexts of the different languages.

Different cultures at times can be a source of miscommunication. Students also appreciated that they at times can be a source of rich experience and open-mindedness. One student reflected: "Learning English opened my mind to how people in other countries think differently about the same issues. It made me more creative because I can now see problems from multiple angles."

### **Theme 5: Language Learning as Essential Cognitive Development**

Most students consider language learning crucial for cognitive development, improving memory, concentration, and problem-solving while enhancing confidence, cultural understanding, and mental discipline. Students strongly endorsed language learning as worthwhile cognitive exercise despite challenges.

As such, mental stamina and complexity with creativity and cultural adaptability remains the fundamental observation from the qualitative findings. The level of mental appreciation for the cultural and cognitive components in learning languages affirms the results from the quantitative study for advanced EFL learners.

## **4.2 Quantitative Findings: Statistical Analysis**

### **4.2.1 Correlation between Language Learning and Cognitive Enhancement**

As indicated in Table 1, Pearson correlation revealed several statistically significant positive correlations between the language learning experience and several outcomes.

**Table 1***Correlations between Language Learning Experience and Cognitive/Psychological Outcomes*

Outcome Variable	Pearson Correlation (r)	Sig. (2-tailed)	N
Cognitive Enhancements	0.614**	0.021	55
Creativity and Mental Flexibility	0.643**	0.000	55
Psychological Impact	0.597**	0.092	55
General Perceptions	0.573**	0.003	55

**Note: \*\* indicates  $p < 0.05$** 

Research Question 1: The experience of language learning had a moderate positive relationship with cognitive enhancement ( $r = 0.614$ ,  $p = 0.021$ , medium effect size). This implies that students who engaged more with language learning reported considerable improvements in working, listening, attention, and problem-solving skills.

Bialystok et al. (2012) and Costa and Sebastián-Gallés (2015) documented similar findings with regard to the executive control advantage observed with bilinguals. The cognitive demand involved in controlling and managing the phonological, syntactic, and semantic levels of multiple languages actively engages the areas of the prefrontal cortex that are dedicated to executive functioning and strengthens these networks through repeated activation (Li et al. 2014).

Research Question 2: the strongest correlation was between language acquisition and creativity/mental flexibility ( $r = 0.643$ ,  $p < 0.001$ , medium to large effect). The enhancement of cognitive flexibility and the promotion of intercultural tolerance are foundational to language learning.

These results also resonate with Cummins (2000) and Yang (2023) on the links between multilingualism and the emergence of divergent thinking alongside cognitive flexibility. While divergent thinking and cognitive flexibility are similar to creative thinking, the former involve the ability to search for and generate various solutions to a problem. Switching and inhibiting gears are essential to creative problem-solving. It should further be noted that this result is contrary to Milczarski et al. (2024), which reported the absence of cognitive reflection in the foreign language context. This may be due to differing measurement approaches, that is, domain-general cognitive reflection tests compared to self-reported perceived flexibility, or differing characteristics of the participants (advanced learners with sustained engagement vs. mixed proficiency samples).

Research Question 3: There is a positive correlation between language acquisition and psychological resilience ( $r = 0.597$ ,  $p = 0.092$ ). Although this is marginal, it implies that learning a language tends to promote psychological resilience in the form of higher self-confidence and lower stress.

This is further supported by qualitative results: the students interviewed reported enhanced self-confidence and a reduction in anxiety as they became competent in the language. This is consistent with Vygotsky's Sociocultural Theory, which views language as a psychological tool that aids self-regulation and social interaction. The successful performance of difficult language tasks helps create a sense of self-efficacy, or self-efficacy (the confidence to control tasks) that may extend to other tasks (Dewaele & MacIntyre, 2016).

#### 4.2.2 Chi-Square Analysis

As outlined in Table 2, the results of the Chi-Square analysis indicate language learning variables and cognitive/psych psychological enhancements are related ( $r = 0.604$ ,  $df = 4$ ,  $F = 7.624$ ,  $p = 0.0005$ ).

**Table 2**

*Chi-Square Correlation between Language Learning and Cognitive/Psychological Enhancement*

Model	R	R Square	Sum of Squares	df	Mean Square	F	Sig.
1	.801	0.604	63.273	4	15.411	7.624	0.0005

This demonstrates strong overall correlations between engagement with learning a language and the various cognitive dimensions which reinforces the idea that organized learning of a language acts as full-fledged cognitive training.

#### 4.2.3 Gender Differences

Research Question 4: Independent samples t-test results (Table 3) show that there are no significant gender differences in any of the domains measured (all  $p > 0.05$ ). Male and female participants both equally experienced the cognitive, creative, and psychological dimensions of language learning.

**Table 3**

*Gender Comparison Using Independent Samples T-Test*

Section	Gender	N	Mean	SD	t-value	df	Sig
Language Learning Experience	Male	12	5.20	2.24	-0.745	23	0.411
	Female	43	5.49	1.76			
Cognitive Enhancements	Male	12	6.34	2.13	0.879		0.413
	Female	43	8.19	1.66			
Creativity and Mental Flexibility	Male	12	5.23	2.06	-1.129		0.207
	Female	43	8.65	2.24			
Psychological Impact	Male	12	11.08	2.20	0.923		0.337
	Female	43	9.78	3.38			
General Perceptions	Male	12	6.00	2.38	0.001		1.000
	Female	43	6.00	2.19			

This result is due to not equivalent gender participation; 12 male and 43 female. This has important practical consequences: language oriented cognitive training should be equitably and universally incorporated into educational policy given its demonstrable benefits, irrespective of gender.

#### 4.3 Integration of Quantitative and Qualitative Findings

The triangulation of the quantitative correlations with the qualitative themes has convergence: enhancement of cognitive functions, of creativity, and of psychological strength are evidenced in the lived experiences of the students. Narratives that speak of improved memory, greater problem-solving, increased creativity, and heightened confidence substantiate the quantitative data while elucidating the psychological mechanisms of the benefits, such as sustained practice, strategic cognitive shifts, and emotional regulation.

The quantitative and qualitative data sets both note challenges of anxiety, comprehension, and practice as well as effort. They reframe such challenges as being productive, fostering resilience and adaptability as learning a language. These challenges

could be positive “desirable difficulties” that language learning and processing stimulate cognitive growth.

## 5. Conclusion

Cognitive and affective growth in advanced learners at Charmo University with structured EFL learning were assessed with mixed methods. In this regard, learning a language helps strengthen the core functions of the executive memory, attention and problem-solving ( $r = 0.614$ ,  $p < 0.05$ ) while also improving cognitive flexibility and adapting to problem-solving, creativity and appreciation of culture and ( $r = 0.643$ ,  $p < 0.05$ ). As psychological resilience was developed with self-confidence and stress ( $r = 0.597$ ,  $p = 0.092$ ) psychological growth was also attained. The absence of statistically significant differences in the male and female data suggests the findings apply universally. The semi-structured interviews back up the qualitative results, revealing that advanced EFL learners consider language learning to be the basis for advanced cognitive and creative thinking and greater appreciation of cultures. Even with the challenges that students described, they noted improvements in memory, attention, and problem-solving, as well as greater mental flexibility and resilience. These findings highlight that, in addition to the core cognitive abilities that language learning entails, it also develops greater adaptability and open-mindedness for students, proving that language learning is an important and positive experience.

Theoretically, this study mounts a counterpoint to the literature that suggests the cognitive benefits of learning EFL at an advanced level and as an adult, in a non-immersion context, remain significant, over bilateral cognitive tradeoffs which pose learning erosion for immigrant populations (Berggren et al., 2019). The findings are supportive of the theory of neuroplasticity and sustained attention to complex cognitive challenges pertaining to EFL learning encourages the executive control and cognitive flexibility of the brain to develop structurally and functionally (Li et al., 2014; Hämäläinen et al., 2017).

The current material positions the process of gaining communicative proficiency in a new language as a positive and productive cognitive-developmental and neuropsychological intervention of a neuropsychological nature at the levels of optimal brain functioning and emotional well-being throughout life. The positive psychological and cognitive outcomes pertaining to the learning of a new language extend outside the limits of the language and contribute to the overall intellectual functioning in adaptive and effective ways as needed for learning and working in a globalized world.

The cross-sectional design of this study imposes limitations on deriving any causal conclusions due to the fact that the cognitive advantages of language learning may either result from or influence the learning of the language. Self-reporting can introduce possible inaccuracies and biases, and objective cognitive assessments should be included in subsequent studies. The sample of advanced EFL learners from a single, and small, institution is likely too small to generalize the findings, especially to other proficiency levels and contexts. Longitudinal and comparative studies with adequately large and diverse samples are necessary to provide more definitive conclusions on the association between language learning and cognitive abilities.

Universities ought to include culture-oriented and coherent language programs into their foundational curricula and framework to recognize language acquisition as brain exercise and communication skill integration. For anxiety-free language instructor training, nurturing, and policy endorsement should emphasize and materially support a language

study policy geared towards affective and cognitive outcomes. Future studies ought to emphasize real outcomes, including employment and cognitive-abstract opportunities the world offers. Potential therapeutic language learning opportunities to aid cognitive-communicative silencing cognitive-communicative disabilities should also be included. Implementing this measure, as suggested, offers the most holistic. Well-structured EFL programs will undoubtedly reinforce their inclusion in higher learning as cognitive-psychological instruments alongside the therapeutic attributes aimed at holistic improvement.

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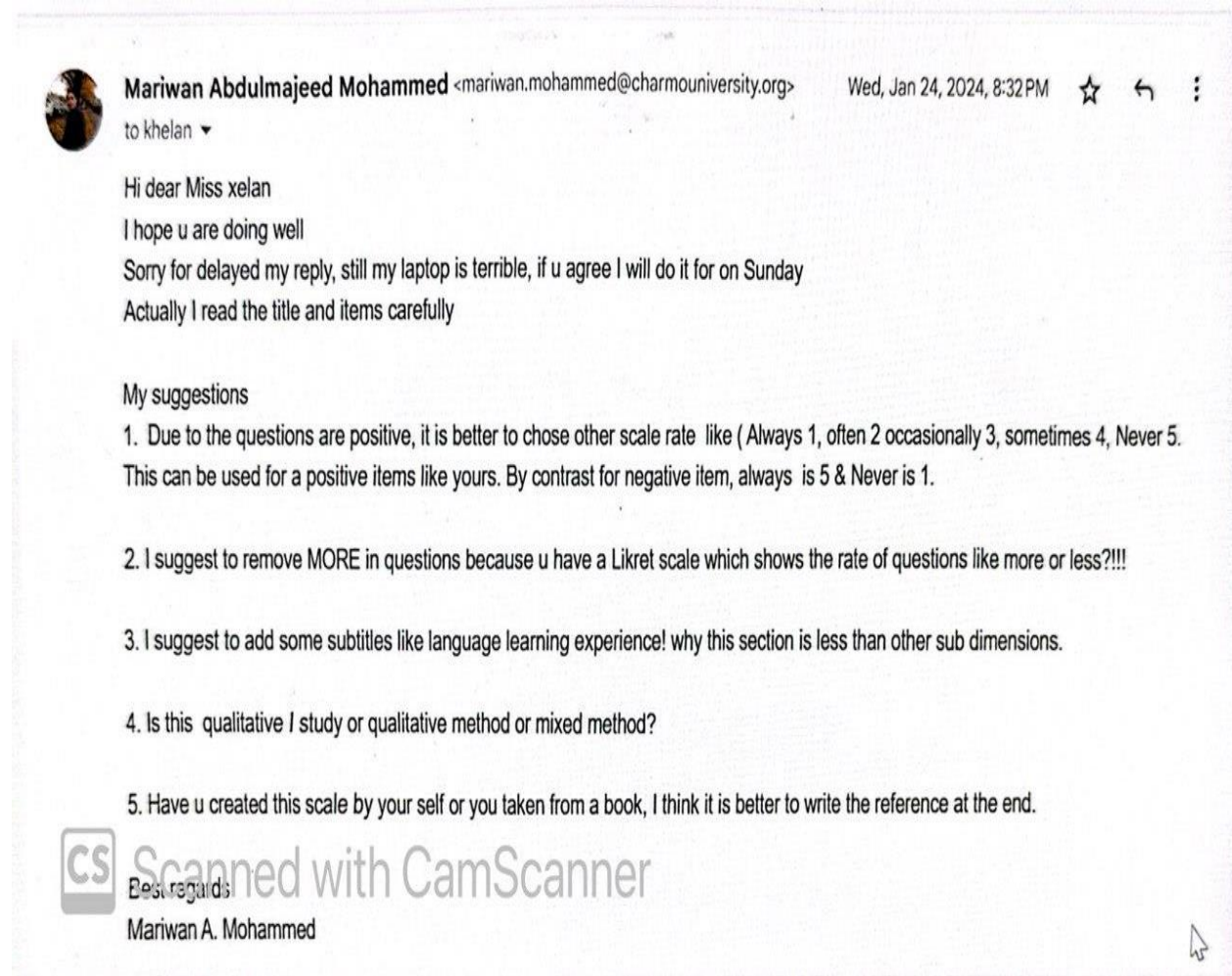
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## Appendix A



## Appendix B

### Language Learning-based Strategy for Cognitive and Mental Enhancement

#### Questionnaire

**Instructions:** Please indicate your level of agreement with each of the following statements where:

1 = strongly disagree, 2 = disagree, 3 = neutral, 4 = agree, and 5 = strongly agree.

#### Demographics:

1. Age: 24
2. Gender: Female
3. What other languages do you speak? English.

S. No		strongly disagree	disagree	neutral	agree	strongly agree
<b>Language Learning Experience</b>						
1.	I started learning a new language at an early age.				✓	
2.	I actively engage in learning new languages					✓
<b>Cognitive Enhancements</b>						
3.	Learning a new language has improved my memory.				✓	
4.	I have improved my attention span since learning a new language.					✓
5.	Language learning has enhanced my problem-solving skills.					✓
6.	I find that learning new languages makes it easier for me to multitask.					✓
<b>Creativity and Mental Flexibility</b>						
7.	Engaging in language learning has made me more creative.				✓	
8.	Learning a new language has increased my cultural awareness.				✓	
9.	I feel more mentally flexible since I started learning new languages.					✓
<b>Psychological Impact</b>						
10.	Language learning has boosted my self-confidence.				✓	
11.	Learning a new language has made me more empathetic towards other cultures.				✓	
12.	Learning a new language has reduced my stress levels.				✓	
13.	I feel a sense of accomplishment when I learn new aspects of a language, which boosts my mood.					✓
<b>General Perceptions</b>						
14.	I believe that learning languages is an effective way to train the brain.					✓

15.	I would recommend language learning for cognitive development to others					✓
16.	Language learning is a rewarding experience beyond just communication				✓	

**Semi-Structured Questions:**

**Background in Language Learning:**

1. Could you please share your experience acquiring a new language and its potential effects on your cognitive abilities, such as memory, attention, and problem-solving skills?

Yeah, when I started a new language, I took courses and they could be more useful and effect my memory I can more focus, remembering things easily.

**Perceived improvements in cognitive function:**

2. How have you observed enhancements in your cognitive abilities since you began acquiring a new language? Could you please share any specific instances or scenarios where these enhancements were noticeable?

I observed that my understanding ability become more well and my information is very wide in my mind the scenarios must be learn.

**Overcoming Obstacles and Flexibility:**

3. What obstacles have you encountered when acquiring a new language, and how did you successfully navigate them? Have these challenges helped improve your mental flexibility or adaptability?

Those challenges that happened for me, I didn't get the phrases, sentences, whatever I listened, these challenge made me try more and flexibility.

**Embracing Innovation and Appreciating Diversity:**

4. What impact do you believe learning a new language has had on your creativity and willingness to embrace new experiences or cultures? Can you provide examples of times when you felt a heightened sense of creativity or cultural awareness due to your language learning?

when I learn culture of country europian my mind more flexible and learn their behaviour. for example when someone invite another immidatly accepted.

**Overall Assessment and Suggestions:**

5. Considering your overall experience, how would you describe the influence of language learning on your cognitive development? In your professional opinion, would you suggest language learning as a cognitive exercise to others, and if so, why?

I think learning language like exercise for mind, our mind improve and we take more experience, yeah, I suggest cognitive exercise because because enhance our memory and we can critical think.