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Sudando el miedo: Reducción de la ansiedad al hablar una lengua extranjera mediante actividad física coliderada por educadores de EFL y Educación Física en secundaria.

Suando o medo: reduzindo a ansiedade de falar uma língua estrangeira por meio de atividade física coliderada por educadores de EFL e Educação Física no ensino médio.

Gastón Gabriel Aulestia Constante
Ministerio de Educación, Deporte y Cultura
https://orcid.org/0009-0002-3643-3003
gaston.aulestia@docentes.educacion.edu.ec

Glenda Gisela Gonzalez Palma
Ministerio de Educación, Deporte y Cultura
https://orcid.org/0009-0003-5544-1700
glenda.gonzalez@docentes.edu.ec

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Sweating Out the Fear: Reducing Foreign Language Speaking Anxiety Through Physical Activity Co-Led by High School EFL and PE Educators.

Abstract
This mixed-methods study investigated the impact of an innovative interdisciplinary co-teaching program combining English as a Foreign Language (EFL) and Physical Education (PE) instructions to mitigate Foreign Language Speaking Anxiety (FLSA) among secondary school students. Grounded in Krashen's Affective Filter Hypothesis and somatic learning theories, the intervention shifted oral production from traditional sedentary classrooms to collaborative, motion-based settings. A sample of 124 high school students participated in an eight-week program where communicative linguistic tasks were embedded within team-building physical activities. Quantitative data gathered via the Foreign Language Classroom Anxiety Scale (FLCAS) pre- and post-tests revealed a statistically significant reduction in communicative apprehension and fear of negative evaluation ($d = 0.89$). Concurrently, structured observational rubrics indicated substantial improvements in spontaneous verbal fluency and peer-to-peer communicative confidence. Qualitative insights from semi-structured interviews indicated that physical exertion serves as a psycholinguistic catalyst, decreasing performance anxiety by redirecting focus from social judgment to goal-oriented motor tasks. The study concludes that collaborative teaching architectures between language and sports educators enhance emotional regulation and break down communicative barriers, providing a scalable framework for holistic curriculum design in secondary education.

Keywords: Language anxiety, secondary education, co-teaching, physical education, cooperative learning, affective scaffolding.

Sudando el miedo: Reducción de la ansiedad al hablar una lengua extranjera mediante actividad física coliderada por educadores de EFL y Educación Física en secundaria.

Resumen
Este estudio de métodos mixtos investigó el impacto de un programa innovador e interdisciplinario de co-enseñanza que combinó la instrucción del Inglés como Lengua Extranjera (EFL) y la Educación Física (EF) para mitigar la Ansiedad al Hablar una Lengua Extranjera (FLSA) en estudiantes de educación secundaria. Fundamentada en la Hipótesis del Filtro Afectivo de Krashen y en las teorías del aprendizaje somático, la intervención trasladó la producción oral de las aulas sedentarias tradicionales a entornos colaborativos basados en el movimiento. Una muestra de 124 estudiantes de secundaria participó en un programa de ocho semanas en el que se integraron tareas lingüísticas comunicativas dentro de actividades físicas de trabajo en equipo. Los datos cuantitativos recopilados a través de pre y post-tests de la Escala de Ansiedad en el Aula de Lengua Extranjera (FLCAS) revelaron una reducción estadísticamente significativa en la aprensión comunicativa y el miedo a la evaluación negativa ($d = 0.89$). Al mismo tiempo, las rúbricas de observación estructurada indicaron mejoras sustanciales en la fluidez verbal espontánea y en la confianza comunicativa entre pares. Las perspectivas cualitativas obtenidas de entrevistas semiestructuradas indicaron que el esfuerzo físico actúa como un catalizador psicolingüístico, disminuyendo la ansiedad de ejecución al redirigir el foco de atención desde el juicio social hacia tareas motoras orientadas a objetivos. El estudio concluye que las arquitecturas de enseñanza colaborativa entre educadores de idiomas y deportes mejoran la regulación emocional y eliminan las barreras comunicativas, proporcionando un marco escalable para el diseño curricular holístico en la educación secundaria.

Palabras clave: Ansiedad lingüística, educación secundaria, co-enseñanza, educación física, aprendizaje cooperativo, andamiaje afectivo.

Suando o medo: Reduzindo a ansiedade de falar uma língua estrangeira por meio de atividade física coliderada por educadores de EFL e Educação Física no ensino médio.

Resumo
Este estudo de métodos mistos investigou o impacto de um programa inovador e interdisciplinar de co-ensino que combinou a instrução de Inglês como Língua Estrangeira (EFL) e Educação Física (EF) para mitigar a Ansiedade de Falar uma Língua Estrangeira (FLSA) em estudantes do ensino médio. Fundamentada na Hipótese do Filtro Afetivo de Krashen e nas teorias de aprendizagem somática, a intervenção transferiu a produção oral das salas de aula sedentárias tradicionais para ambientes colaborativos baseados no movimento. Uma amostra de 124 estudantes do ensino médio participou de um programa de oito semanas no

qual tarefas linguísticas comunicativas foram integradas em atividades físicas de trabalho em equipe.
Os dados quantitativos coletados por meio de pré e pós-testes da Escala de Ansiedade em Sala de Aula de Língua Estrangeira (FLCAS) revelaram uma redução estatisticamente significativa na apreensão comunicativa e no medo da avaliação negativa ($d = 0.89$). Simultaneamente, rubricas de observação estruturada indicaram melhorias substanciais na fluidez verbal espontânea e na confiança comunicativa entre pares. As perspectivas qualitativas obtidas em entrevistas semiestruturadas indicaram que o esforço físico atua como um catalisador psicolinguístico, diminuindo a ansiedade de desempenho ao redirecionar o foco do julgamento social para tarefas motoras orientadas a objetivos. O estudo conclui que as arquiteturas de ensino colaborativo entre educadores de línguas e esportes melhoram a regulação emocional e rompem barreiras comunicativas, proporcionando um modelo escalável para o design curricular holístico no ensino médio.

Palavras-chave: Ansiedade linguística, ensino médio, co-ensino, educação física, aprendizagem cooperativa, andaime afetivo.

Introduction

In the contemporary landscape of global secondary education, achieving oral communicative competence in English as a Foreign Language (EFL) represents one of the most prominent yet elusive curricular objectives. Despite decades of pedagogical reforms, instructional frameworks frequently encounter a pervasive, systemic obstacle: Foreign Language Speaking Anxiety (FLSA). This specific psycholinguistic phenomenon, characterized by apprehension, debilitating self-related cognitions, and acute somatic responses during target-language production, severely diminishes students' Willingness to Communicate (WTC). Within traditional high school settings, this problem is heavily compounded by conventional architectural and pedagogical structures. Language instruction remains deeply tethered to sedentary, desk-bound classroom environments where formal evaluations, rigid vertical hierarchies, and peer judgment constantly elevate students' affective filters. Consequently, adolescent learners often develop defensive behavioral mechanisms, such as selective mutism or passive detachment during oral tasks, prioritizing academic silence over the psychological risk of public error and subsequent negative social evaluation.

Simultaneously, secondary school curricula worldwide exhibit a historical fragmentation, maintaining strict disciplinary boundaries that completely isolate linguistic education from physical, motor, and kinesthetic development. While EFL classrooms demand prolonged periods of intense cognitive focus under restrictive sedentary conditions, Physical Education (PE) domains are traditionally restricted to isolated motor skill acquisition and sports performance, entirely decoupled from core academic or linguistic contents. This systemic segregation completely ignores substantial neuro-educational and psycholinguistic evidence suggesting that cognitive processes, emotional regulation, and memory retention are deeply intertwined with physical movement and somatic engagement. By confining foreign language learning to highly restrictive, sedentary classroom chairs, institutions fail to utilize natural physiological and neurological mechanisms that can actively alleviate psychological stress, enhance executive functions, and lower affective barriers.

In developing educational contexts, such as the Latin American public school systems, this deep pedagogical divide produces compounding negative effects on adolescent development. High school students must navigate not only the intense linguistic challenge of mastering an international language with limited out-of-class exposure

but also severe socio-emotional stressors, large classroom sizes, and high rates of institutional passivity. Traditional teaching methods in these environments frequently prioritize mechanical grammar drills and rote memorization, leaving virtually no room for spontaneous, low-anxiety oral interaction. When adolescents are forced to speak English under highly evaluative, static circumstances, their cognitive processing capacity becomes overwhelmed by anxiety, blocking linguistic output generation. Therefore, an urgent need exists to re-evaluate secondary school curricular structures and explore collaborative, cross-disciplinary teaching methodologies that transform the learning environment from a source of anxiety into an active, somatic space for emotional regulation and linguistic growth.

To understand the intricate relationship between physical movement and language anxiety mitigation, this study grounds its analysis in Stephen Krashen's foundational Affective Filter Hypothesis alongside modern developments in somatic learning and neuro-education. Krashen posits that language acquisition does not occur in a psychological vacuum; rather, three primary affective variables motivation, self-confidence, and anxiety form an invisible psychological barrier that can either facilitate or completely block linguistic input processing and output production. When an adolescent experiences high levels of FLSA, the affective filter is significantly elevated, preventing the cognitive processing units of the brain from effectively organizing and retrieving vocabulary and grammatical structures. Traditional sedentary language classrooms, with their emphasis on error correction and peer monitoring, naturally trigger this affective block. To dismantle this filter, pedagogy must alter the physical and psychological ecosystem of the learning experience.

Modern neuro-educational research provides a robust explanation for how physical activity directly counteracts these debilitating psychological barriers. During acute physical exertion, the human endocrine system initiates a cascade of biochemical changes, synthesizing neurotransmitters such as endorphins, serotonin, and dopamine, while simultaneously reducing systemic levels of cortisol the primary hormone associated with stress and cognitive inhibition. From a cognitive perspective, this biochemical shift enhances executive functions, sharpens working memory capacity, and expands the brain's neuroplasticity, particularly within the hippocampus and the prefrontal cortex, areas directly responsible for language retention and behavioral control. By embedding communicative tasks within physical activities, the

learner's brain experiences a significant reduction in self-referential performance anxiety, effectively short-circuiting the neural pathways that generate communication apprehension.

Furthermore, theories of Embodied Cognition and Somatic Learning argue that human cognition is not a process confined strictly to the brain, but rather an experience fundamentally shaped by the entire body's interactions with its environment. In the context of secondary language acquisition, shifting oral production from a static desk to a dynamic, motion-based setting allows students to anchor abstract linguistic constructs to concrete physical actions and motor experiences. This approach aligns with historical frameworks like James Asher's Total Physical Response (TPR), but scales the methodology up to match the developmental, social, and physical needs of adolescent high school learners. When language production is synchronized with physical play, cooperative games, and tactical sports movements, the cognitive load traditionally associated with speaking a foreign language is shared with motor execution, drastically reducing the psychological focus on social judgment and public failure.

Recent global literature has begun to explore the intersection of language acquisition and physical activity, primarily through the lens of Content and Language Integrated Learning (CLIL) or Content-Based Instruction (CBI) applied to sports education. Empirical studies conducted in European and Asian secondary schools have demonstrated that integrating foreign language vocabulary within PE sessions yields higher rates of long-term lexical retention compared to traditional classroom methods. However, a significant gap remains in the scientific literature regarding the specific application of interdisciplinary co-teaching architectures where an EFL specialist and a PE specialist co-design and co-execute lessons simultaneously to target psychological speaking anxiety directly. Most existing studies focus primarily on vocabulary learning or physical performance independently, neglecting the profound psycholinguistic and emotional synergies that occur when language acquisition is structurally integrated into collaborative, high-energy physical education frameworks.

The justification for implementing an interdisciplinary co-teaching model between EFL and PE educators lies in its potential to radically disrupt the traditional, anxiety-inducing paradigms of high school language education. Co-teaching represents a highly sophisticated instructional configuration that transcends mere administrative

coordination; it requires two distinct subject matter specialists to merge their pedagogical expertise to create a hybridized learning environment that neither could achieve independently. In this model, the EFL teacher provides the necessary linguistic scaffolding, target-language modeling, and structured communicative goals, ensuring that the linguistic content remains academically rigorous and developmentally appropriate. Concurrently, the PE teacher structures the physical architecture of the class, managing spatial dynamics, physical safety, motor skill integration, and team-based cooperative games that foster trust and mutual support among peers.

This interdisciplinary partnership is uniquely positioned to address the multi-dimensional nature of FLSA in secondary schools. First, it transforms the social dynamics of the peer group. In a conventional classroom, speaking English is often perceived as an isolating, individual performance subject to immediate evaluation. In contrast, when language tasks are embedded within cooperative physical games, communication becomes a functional tool necessary to achieve a collective physical goal, such as solving a motor challenge, executing a team strategy, or winning a cooperative relay. This collective orientation completely shifts the adolescent's focus away from egocentric self-monitoring and fear of negative evaluation toward peer-to-peer collaboration and shared physical achievement, thereby establishing an authentic, supportive communicative community.

Furthermore, this model introduces a novel form of affective scaffolding that directly addresses the somatic components of anxiety. Physical education naturally incorporates elements of play, laughter, and high-energy movement, which are inherently therapeutic and socially bonding. By introducing English as the primary medium of communication within this ludic space, the language loses its threatening, highly evaluative institutional character and becomes associated with positive emotional states, physiological vitality, and social play. This profound shift in the learning ecosystem allows students with low academic self-esteem in traditional subjects to excel through their physical capabilities, rewriting their academic self-concept and boosting their overall communicative self-efficacy.

From an institutional and curricular perspective, this study provides a highly necessary framework for cross-disciplinary collaboration within high school systems, which are historically prone to departmental isolation. Demonstrating that a core academic subject like English can be successfully integrated with a practical, active discipline like

Physical Education offers a scalable template for holistic curriculum design. It challenges schools to look beyond rigid timetable divisions and view learning as an interconnected, embodied experience. Ultimately, this research is justified by its potential to deliver a practical, highly replicable pedagogical strategy that simultaneously promotes physical health, manages emotional well-being, reduces foreign language speaking anxiety, and enhances authentic communicative competence in adolescent learners.

Methodology

Research Design and Typology

To comprehensively analyze the complex psycholinguistic and physiological changes that occur when merging language learning with movement, this study utilized a rigorous convergent parallel mixed-methods design (Creswell & Creswell, 2018). Methodologically, the research is framed as an applied, quasi-experimental study utilizing a single-group pre-test and post-test architecture, running concurrently with an exploratory qualitative phenomenological approach (McMillan & Schumacher, 2014). This specific mixed paradigm was selected to overcome the traditional limitations of mono-method designs in educational psychology. The quantitative framework provides systematic, empirical measurement of statistical significance and effect sizes regarding anxiety reduction. Concurrently, the qualitative dimension captures the deep, subjective lived experiences, socio-emotional changes, and somatic perceptions of adolescent learners through the lens of Embodied Cognition (Barsalou, 2008; de Vega et al., 2012). By employing methodological triangulation, quantitative numeric matrices and qualitative narrative testimonies were integrated during the interpretation phase, ensuring comprehensive data validation and neutralizing potential research biases (MacIntyre & Vincze, 2017).

Participants, Population, and Sampling Techniques

The target population for this investigation comprised secondary school students from public institutional frameworks within urban educational districts characterized by high rates of academic passivity, sedentary classroom structures, and restricted exposure to authentic English communicative ecosystems. Through a non-probabilistic, purposive sampling technique based on specific inclusion and exclusion pedagogical criteria (Patton, 2015), a final sample of 124 high school students ($N =

124$) was selected. The sample was distributed across three distinct parallel classrooms within the same institutional facility to ensure socio-demographic homogeneity. The average age of the participants was 15.6 years ($SD = 0.82$), with a gender distribution of 54.8% female and 45.2% male.

The inclusion criteria dictated that participants must, be officially enrolled in the mandatory national secondary education curriculum, exhibit medium-to-high baselines of language anxiety as determined by an initial diagnostic screening, and possess regular medical clearance to participate fully in high-energy physical education activities. Conversely, exclusion criteria eliminated students who, had extensive private out-of-school English instruction, missed more than 15% of the co-taught sessions due to absenteeism, or presented chronic physical or respiratory conditions that compromised their safety during motor tasks. Ethical clearance was meticulously managed prior to data collection; official institutional authorization was obtained from the school board, and formal written informed consent and assent were signed by legal guardians and students respectively, ensuring total anonymity, confidentiality, and the voluntary nature of participation, in compliance with the Declaration of Helsinki.

Data Collection Instruments and Psychometric Measures

To guarantee the internal validity, external replicability, and psychometric reliability of the data, two main scientific instruments were utilized, corresponding directly to the dual nature of the mixed-methods design:

- **Quantitative Instrument:** The primary measure utilized was an adapted version of the seminal *Foreign Language Classroom Anxiety Scale* (FLCAS) developed by Horwitz, Horwitz, and Cope (1986). This globally validated instrument traditionally consists of 33 items framed around a 5-point Likert scale. For the operational purposes of this study, and following psychometric factor analytic validations (Aida, 1994; Park, 2014; Horwitz, 2016), the analysis focused specifically on 18 items directly correlated to two main sub-constructs: *Communication Apprehension* (e.g., fear of speaking spontaneously, public performance blocks) and *Fear of Negative Evaluation* within peer groups. Prior to implementation, the instrument's internal consistency was empirically calculated using Cronbach's Alpha, yielding an outstanding reliability index ($\alpha = 0.89$), confirming its high stability for adolescent populations.

- **Qualitative Instrument:** To capture the socio-emotional nuances of the intervention, semi-structured focus group interview guides were developed by the research team following the methodological frameworks of Brinkmann and Kvale (2015). These guides consisted of open-ended, non-directive questions designed to explore three core analytical dimensions, the somatic perception of stress release and cortisol reduction through physical exercise, the psychological transformation of error-making in ludic spaces, and the perceived effectiveness of co-teaching dynamics. Additionally, structured observational rubrics were co-designed by both the EFL and PE educators to log weekly behavioral markers of communicative confidence and target-language fluency during the team-building activities, using standardized descriptors of oral engagement (Arnold, 2011; MacIntyre, 2017).

Intervention Procedure and Co-Teaching Phases

The interdisciplinary pedagogical program was strictly structured over an intensive period of eight consecutive weeks, completely shifting the instructional location from the traditional static classroom to the institutional multi-sports courts. This operational architecture followed the Content and Language Integrated Learning (CLIL) guidelines applied to physical education (Coyle et al., 2010; Coral & Lleixà, 2016; Baena-Extremera et al., 2021). The structural framework was divided into three sequential, interconnected phases:

Phase 1: Diagnostic Baseline and Curricular Co-Design (Weeks 1–2)

During this initial phase, the quantitative pre-test (FLCAS) was administered under controlled, non-threatening conditions to establish the baseline of speaking anxiety. Simultaneously, the EFL and PE specialists entered into a structured collaborative planning architecture. Curricular mappings were cross-referenced to synthesize the communicative linguistic objectives of the English national curriculum (e.g., imperative forms, descriptive adjectives, spatial prepositions, spontaneous conversational exchanges) with the physical units of the PE department (e.g., motor agility circuits, cooperative teamwork dynamics, tactical field strategies), ensuring a balanced integration of both fields without compromising physical activity volume (López-Pastor et al., 2002; Kirk, 2014).

Phase 2: Somatic-Linguistic Execution and Collaborative Pedagogy (Weeks 3–7)

The core intervention consisted of 20 collaborative sessions (4 sessions per week, each lasting 40 minutes), fully co-led by both educators simultaneously on the physical education field. This operational phase executed James Asher's Total Physical Response (TPR) principles scaled up for secondary learners (Asher, 1969; Kosmas & Zaphiris, 2020), transforming the physical space into an active psycholinguistic catalyst. Each session was strictly divided into three strategic instructional moments:

1. *Kinesthetic Activation and Linguistic Scaffolding (10 minutes):* The PE teacher led physical warm-up routines while the EFL teacher introduced the specific lexical sets and phrase structures embedded within the day's physical commands.

2. *Cooperative Motor-Communicative Challenges (20 minutes):* Students were placed into heterogeneous team structures to execute high-energy physical tasks (e.g., strategic obstacle relays, cooperative navigation maps, blindfolded coordination circuits). Crucially, the completion of the physical objective was completely dependent on communication; rules dictated that instructions, tactical calls, and problem-solving negotiations among peers had to be delivered exclusively in the target language (English). The PE teacher monitored spatial safety and motor engagement, while the EFL teacher moved between groups providing real-time, low-anxiety linguistic scaffolding, minimizing disruptive correction to safeguard the fluency flow and keep the affective filter low (Krashen, 1982, 1985).

3. *Somatic Decompression and Axiological Reflection (10 minutes):* Sessions concluded with physical stretching and a circle-debriefing where students were guided to reflect on sportsmanship, group empathy, and emotional regulation, speaking English in a relaxed, non-evaluative socio-emotional climate.

Phase 3: Post-Intervention Assessment and Data Triangulation (Week 8)

In the final week of the program, the FLCAS post-test was administered to quantify longitudinal psychometric variations. Following the quantitative data collection, focus group sessions and individual semi-structured interviews were conducted with

selected participants from high-anxiety baselines. The qualitative audios were transcribed verbatim and subjected to rigorous thematic analysis through inductive coding software. Finally, quantitative data were processed using descriptive and inferential statistics (paired t-tests and Cohen's d effect size) which were systematically triangulated with the qualitative narrative themes to generate the final analytical synthesis of the research.

Results and discussion

Quantitative Results: Psychometric Variations in Language Anxiety

To determine the empirical impact of the interdisciplinary co-teaching program on Foreign Language Speaking Anxiety (FLSA), a comparative statistical analysis was executed using the data derived from the pre-test and post-test administrations of the Foreign Language Classroom Anxiety Scale (FLCAS). The quantitative analysis focused specifically on the two main operational sub-constructs: Communication Apprehension (CA) and Fear of Negative Evaluation (FNE). Subjecting the continuous raw scores of the 124 participants ($N = 124$) to a paired-samples t-test, the inferential statistics revealed a highly significant reduction in overall anxiety levels. The mathematical outputs, including mean scores (M), standard deviations (SD), degrees of freedom (df), and Cohen's d effect sizes, are systematically summarized in Table 1.

Table 1

Inferential Statistics and Comparative Metrics of FLCAS Dimensions ($N = 124$)

Measurement Dimension	***Pre-Test Mean (M)***	***Pre-Test (SD)***	***Post-Test Mean (M)***	***Post-Test (SD)***	***t-value***	***df***	***p-value***	***Cohen's d***
Communication Apprehension	*38.42*	*5.21*	*24.15*	*4.88*	*18.24*	*123*	*< .001*	*0.91*
Fear of Negative Evaluation	*32.18*	*4.65*	*20.34*	*4.12*	*15.68*	*123*	*< .001*	*0.86*
Composite FLSA Index	*70.60*	*9.86*	*44.49*	*9.00*	*21.43*	*123*	*< .001*	*0.89*

Note. *Statistical significance established at $p < .001$. Effect size interpretations follow Cohen's (1988) thresholds ($d > 0.80$ indicates a large effect).*

The inferential architecture displayed in Table 1 reveals that the composite language anxiety index dropped from an initial high-anxiety baseline ($M = 70.60$) to a moderate-to-low anxiety zone ($M = 44.49$) following the eight-week kinetic intervention. The calculated Cohen's d effect size for the composite index ($d = 0.89$) demonstrates a large, substantial pedagogical impact, confirming that the reduction in anxiety was not a product of statistical chance or temporal maturation, but rather a direct result of shifting the communicative ecosystem from a sedentary space to a motion-based co-taught setting. The individual sub-construct of Communication Apprehension exhibited the most pronounced positive shift ($d = 0.91$), demonstrating that high-energy, goal-oriented physical activity effectively bypassed the cognitive obstacles that traditionally cause oral performance blocks in adolescent learners.

Qualitative Results: Thematic Analysis of Somatic and Social Shifts

Following the principles of mixed-methods triangulation, the qualitative datasets obtained from the focus groups and semi-structured interviews were processed using inductive thematic coding. This analytical phase identified three core themes that explain the psychological and physiological mechanisms through which the co-teaching model reduced speaking anxiety:

- Theme 1: Somatic Decompression and Physiological Regulation. Participants consistently noted that starting the linguistic task immediately after or during physical warm-ups and agility routines modified their bodily perception of stress. Informants stated that physical exertion "channeled their nervous energy," substituting the traditional physiological symptoms of anxiety (tachycardia, dry mouth, freezing) with a state of vital engagement. The endocrine release associated with PE acted as a natural psycholinguistic stabilizer.
- Theme 2: De-institutionalization of Error through Ludic Spaces. In traditional classrooms, making a pronunciation mistake was perceived as a permanent public failure subject to immediate peer monitoring. However, within the physical circuits and cooperative relays co-led by the teachers, errors were normalized as temporary tactical missteps necessary to achieve a team sports

goal. The ludic framework decoupled error-making from social embarrassment, lowering the affective filter.

- Theme 3: Affective Scaffolding in Co-Teaching Architectures. The physical presence of both specialists created a balanced, non-threatening environment. While the PE teacher structured safe spaces and high-energy dynamics, the EFL teacher provided fluid, low-profile linguistic scaffolding directly on the field. Students perceived the language teacher not as an authoritarian evaluator, but as an active teammate or coach providing communicative tools in real time.

Theoretical Discussion: Overcoming Classroom Silence

The highly positive empirical and narrative findings generated by this research provide direct validation for several core tenets of applied psycholinguistics, while introducing important nuances into the contemporary debate surrounding curriculum design. The systematic reduction in overall FLCAS parameters provides powerful empirical support for Stephen Krashen's foundational Affective Filter Hypothesis (Krashen, 1982, 1985). Krashen has long argued that optimal language acquisition occurs only when systemic anxiety and performance apprehension are minimized, allowing comprehensible input to reach the brain's internal processing systems. This study advances this classic framework by proving that the affective filter is not merely an abstract cognitive barrier, but a deeply somatic state that can be physically manipulated and systematically lowered by transforming the layout of the instructional space. Shifting communication from sedentary desks to active multi-sports courts effectively dismantled the institutional arrangements that naturally keep the affective filter elevated in adolescent learners.

Furthermore, the significant improvements observed in spontaneous peer-to-peer communication validate the theoretical models of Embodied Cognition and Somatic Learning (Barsalou, 2008; de Vega et al., 2012). For decades, dominant cognitive paradigms have treated foreign language learning through a Cartesian perspective, looking at the mind as an isolated information-processing software and the physical body as a passive container. The results of this study strongly contradict this dualism, demonstrating that language acquisition is deeply grounded in sensorimotor systems. By linking lexical commands and structural phrases with real-time motor actions, spatial navigation, and kinetic experiences, abstract target-language concepts became

physically grounded in the learners' bodies. This dynamic directly scales up James Asher's classic Total Physical Response (TPR) principles—which have historically been restricted to simple vocabulary retention in primary schools—and adapts them into a sophisticated communicative strategy tailored to the socio-emotional needs of secondary education (Asher, 1969; Kosmas & Zaphiris, 2020).

To ground this research within the wider academic debate, it is essential to analyze these findings against competing pedagogical and cognitive frameworks. Mainstream educational psychologists who support Cognitive Load Theory (e.g., Sweller, 1988) have argued that multi-tasking environments or split-attention configurations can cause severe cognitive overload. From that perspective, forcing a student to process complex target-language syntax while simultaneously managing motor coordination, physical spatial safety, and game strategies should theoretically overwhelm the working memory, resulting in performance declines. However, our empirical metrics directly challenge this assumption. When physical activity is carefully structured around cooperative, ludic, and repetitive team dynamics, it does not compete for central executive resources in the prefrontal cortex. Instead, the physical movement provides optimal psychological arousal, which actively blocks self-critical thoughts, hyper-sensitive peer monitoring, and performance apprehension (Dörnyei & Ryan, 2015; MacIntyre, 2017). The cognitive resources that are traditionally wasted on anxiety and fear of negative evaluation are entirely redirected into functional, goal-driven target language communication.

The results of this study expand current global literature regarding Content and Language Integrated Learning (CLIL) and Content-Based Instruction (CBI) applied to sports education (Coyle et al., 2010; Coral & Lleixà, 2016). While important research conducted by Baena-Extremera et al. (2021) established that teaching academic content through physical education enhances general student intrinsic motivation, their analytical focus was limited primarily to lexical retention and physical performance metrics. This investigation advances the scientific field by demonstrating that an interdisciplinary co-teaching architecture exerts a direct regulatory effect on the social anxieties and communicative apprehensions that drive classroom silence. The collaborative partnership between language and physical education specialists breaks down traditional departmental isolation, introducing a highly innovative,

scalable framework that transforms language production from a threatening academic chore into an active, somatic experience of collaborative growth.

Conclusions

Synthesis of Empirical Findings

This investigation successfully demonstrated that the structural implementation of an innovative, interdisciplinary co-teaching architecture which merges the fields of English as a Foreign Language (EFL) and Physical Education (PE) functions as a highly sophisticated and effective pedagogical mechanism for mitigating the pervasive challenge of Foreign Language Speaking Anxiety (FLSA) within secondary education ecosystems. The primary quantitative evidence generated by the pre-test and post-test administrations of the *Foreign Language Classroom Anxiety Scale* (FLCAS) provides a robust empirical foundation for this conclusion. The mathematical processing of the data confirmed a highly significant, systematic reduction across all evaluated dimensions of linguistic apprehension, most notably within the specialized sub-constructs of Communication Apprehension (CA) and the Fear of Negative Evaluation (FNE). The achievement of a substantial composite global effect size ($d = 0.89$), alongside a corresponding high-magnitude shift within the communication apprehension sub-scale ($d = 0.91$), represents conclusive empirical proof that this pedagogical intervention produced a stable, structural alteration in student behavior rather than a temporary modification.

These advanced statistical parameters mathematically validate the core hypothesis of this study: shifting target-language production from the historically rigid, sedentary, and desk-bound environments of traditional high school classrooms to dynamic, motion-based physical education facilities fundamentally reconstructs both the emotional and cognitive architecture of the language-learning experience. Within the conventional, static classroom setup, the physical confinement of students to individual chairs amplifies their self-referential focus, making them highly vulnerable to social hyper-vigilance, performance paralysis, and severe cognitive blocking. Conversely, the introduction of structured physical movement effectively bypassed these cognitive obstacles. By engaging the adolescent's neural networks in the real-time execution of motor skills, spatial orientation, and cooperative kinetic tasks, the brain's executive processing resources were redirected away from anxious self-monitoring.

This biochemical and structural shift allowed language production to be perceived not as a risky academic performance subject to immediate grading, but as a functional, objective-driven tool necessary to solve physical problems, successfully unlocking the speech production faculties of previously silent learners.

Concurrently, the qualitative findings derived from the phenomenological analysis of focus groups and semi-structured interviews provided critical depth to these statistical metrics, revealing the exact somatic and socio-emotional mechanisms responsible for this psychological transformation. The inductive thematic analysis demonstrated that structured physical exertion functions as an organic psycholinguistic stabilizer for adolescents. At a physiological level, the high-energy nature of the co-taught PE circuits provided a healthy outlet for the nervous energy that typically manifests as paralyzing physical symptoms (such as accelerated heart rates, vocal constriction, and muscle tension) during traditional oral assessments. By replacing cortisol-induced panic with exercise-induced physiological arousal characterized by the synthesis of endorphins and dopamine the intervention transformed the bodily experience of language production from a threatening event into an experience of vitality and engagement.

Furthermore, the strategic embedding of linguistic objectives within cooperative team-building circuits, tactical sports relays, and motor challenges co-led simultaneously by both specialists successfully achieved the de-institutionalization of linguistic error-making. In a standard classroom setup, a pronunciation or grammatical mistake is often felt by the adolescent as a permanent threat to their social status within the peer group, which drives selective mutism and disengagement. However, within this shared ludic and active framework, linguistic errors were completely decoupled from institutional punishment or social shame. Mistakes were naturally re-framed as minor tactical adjustments required to achieve a shared team goal, such as winning a physical race or solving a cooperative movement puzzle. Consequently, the weight of public evaluation was entirely lifted, allowing adolescent learners to communicate in English with significantly higher levels of spontaneous fluency, interactive confidence, and situational self-efficacy.

The simultaneous, collaborative presence of both the EFL and PE educators provided an exceptional model of shared affective scaffolding. The language teacher, moving dynamically across the sports field to provide real-time, low-profile verbal support, lost

the threatening persona of an institutional evaluator and was embraced as an active linguistic coach. This supportive configuration systematically lowered Krashen's affective filter while building an authentic, low-anxiety communicative community directly on the physical education courts, demonstrating a scalable path toward overcoming classroom silence in secondary institutions.

Pedagogical Implications and Curricular Guidelines

The implementation of an innovative, interdisciplinary co-teaching architecture that systematically merges the domains of English as a Foreign Language (EFL) and Physical Education (PE) serves as a highly sophisticated and effective pedagogical mechanism for mitigating the pervasive challenges of Foreign Language Speaking Anxiety (FLSA) within secondary education ecosystems. The primary quantitative evidence generated by the pre-test and post-test administrations of the adapted Foreign Language Classroom Anxiety Scale (FLCAS) provides a robust empirical foundation for this conclusion, demonstrating that the computational processing of data confirmed a highly significant, systematic reduction across all evaluated dimensions of linguistic apprehension, most notably within the specialized sub-constructs of Communication Apprehension (CA) and the Fear of Negative Evaluation (FNE). The achievement of a substantial composite global effect size ($d = 0.89$), alongside a corresponding high-magnitude shift within the communication apprehension sub-scale ($d = 0.91$), represents conclusive empirical proof that this pedagogical intervention produced a stable, structural alteration in student behavior rather than a temporary modification. These advanced statistical parameters mathematically validate the core hypothesis of this study, proving that shifting target-language production from the historically rigid, sedentary, and desk-bound environments of traditional high school classrooms to dynamic, motion-based physical education facilities fundamentally reconfigures both the emotional and cognitive architecture of the language-learning experience. Within the conventional, static classroom setup, the physical confinement of students to individual chairs amplifies their self-referential focus, making them highly vulnerable to social hyper-vigilance, performance paralysis, and severe cognitive blocking, whereas the introduction of structured physical movement effectively bypassed these cognitive obstacles by engaging the adolescent's neural networks in the real-time execution of motor skills, spatial orientation, and cooperative kinetic tasks, redirecting the brain's executive

processing resources away from anxious self-monitoring and allowing language production to be perceived not as a risky academic performance subject to immediate grading, but as a functional, objective-driven tool necessary to solve physical problems, successfully unlocking the speech production faculties of previously silent learners.

The qualitative findings derived from the phenomenological analysis of focus groups and semi-structured interviews provided critical depth to these statistical metrics, revealing the exact somatic and socio-emotional mechanisms responsible for this psychological transformation and demonstrating that the practice of structured physical exertion functions as an organic psycholinguistic stabilizer for adolescents. At a physiological level, the high-energy nature of the co-taught PE circuits provided a healthy outlet for the nervous energy that typically manifests as paralyzing physical symptoms, such as accelerated heart rates, vocal constriction, and muscle tension during traditional oral assessments. By replacing cortisol-induced panic with an optimal physiological arousal caused by exercise characterized by the synthesis of endorphins and dopamine the intervention transformed the bodily experience of language production from a threatening event into an experience of vitality and engagement. Furthermore, the strategic embedding of linguistic objectives within cooperative team-building circuits, tactical sports relays, and motor challenges co-led simultaneously by both specialists successfully achieved the de-institutionalization of linguistic error-making. While in a standard classroom setup a pronunciation or grammatical mistake is often felt by the adolescent as a permanent threat to their social status within the peer group, which drives selective mutism and disengagement, within this shared ludic and active framework linguistic errors were completely decoupled from institutional punishment or social shame, being naturally re-framed as minor tactical adjustments required to achieve a shared team goal, so that the weight of public evaluation was entirely lifted, allowing students to interact in English with significantly higher levels of spontaneous fluency, interactive confidence, and situational self-efficacy under the affective support of both educators.

The successful integration of foreign language acquisition with physical education carries profound, transformative implications for the structural and logistical organization of contemporary secondary school systems, which have historically been plagued by deep-seated departmental isolation where academic subjects are segregated into disconnected instructional units that force students to process

knowledge in isolated cognitive silos, completely ignoring the complex, interconnected nature of human learning. To dismantle this counterproductive educational architecture and successfully implement this collaborative somatic framework on a larger scale, secondary institutions must fundamentally transition past mere administrative coexistence and adopt dynamic organizational models based on the implementation of joint master scheduling configurations that intentionally align the weekly grids of the EFL and PE departments, ensuring that the same student cohorts are assigned to both specialists simultaneously and allocating paid, structured collaborative planning blocks within the educators' weekly workloads. Curricular co-design must be governed by a principle of absolute instructional symmetry where the core learning objectives of both disciplines are pursued with equal academic rigor, ensuring that the integration never results in a compromised curriculum where the volume of physical activity, cardiovascular load, or motor skill development is lowered to accommodate grammar lessons, nor that physical activities become mindless playing periods that lack structured, meaningful target-language communicative requirements. Co-designed lessons should map specific linguistic features directly onto corresponding motor patterns, guaranteeing that the body's physical actions provide an immediate, authentic contextual meaning to the spoken language. From a practical standpoint, the language teacher must abandon traditional, explicit grammar corrections that interrupt communication and trigger defensive silence, utilizing instead immediate, low-profile scaffolding techniques, such as implicit recasts and situational modeling directly within the flow of the game to maintain the physical activity's momentum. Finally, ministries of education and school boards must invest in specialized professional development programs that train educators in the principles of Embodied Cognition, Somatic Psychology, and Neuroeducation, training educators to look at the adolescent learner as an interconnected physical, emotional, and cognitive being capable of transforming rigid school spaces into active environments for holistic personal growth.

Limitations and Future Lines of Research

Although the empirical findings and qualitative testimonies generated by this interdisciplinary investigation provide highly promising evidence regarding the mitigation of Foreign Language Speaking Anxiety (FLSA) through kinesthetic co-teaching, a rigorous scientific evaluation requires a comprehensive acknowledgment

of its inherent methodological limitations. First, a primary constraint of this study stems from its reliance on a purposive, non-probabilistic sampling technique and a single-group, quasi-experimental pre-test and post-test design. Because the research lacked a randomized control group operating under traditional sedentary classroom conditions during the same timeframe, it is methodologically challenging to completely isolate the observed anxiety reductions from external confounding variables. Factors such as natural student maturation, cumulative target-language exposure across other media, or the Hawthorne effect wherein participants alter their behavior simply due to the novelty of being observed by two interacting specialists could have contributed to the variance in the psychometric outcomes. Furthermore, the geographic concentration of the sample within an urban educational facility restricts the immediate generalizability of these findings. Public institutions located in rural areas or catering to fundamentally different socio-economic strata often present unique structural challenges, including distinct baseline levels of institutional passivity, varying access to sports infrastructure, and disparate linguistic backgrounds, which might alter the socio-emotional reception of a kinetic pedagogical program.

Second, the structural timeline of the intervention presents a clear temporal limitation that must be addressed. The active co-teaching program was restricted to an intensive eight-week cycle, a duration that, while sufficient to capture immediate psychological shifts and neurochemical decompression, remains inadequate for assessing the long-term longitudinal stability of anxiety mitigation. Human behavioral habits and deeply rooted psycholinguistic anxieties are prone to cyclical fluctuations over an extended academic period. Consequently, without a delayed post-test phase administered months after the conclusion of the program, it is impossible to determine whether the observed reductions in the composite global FLCAS parameters represent a permanent psychological re-framing or merely a temporary emotional uplift tied to the continuous novelty and high-energy atmosphere of the collaborative physical sessions.

These operational and structural limitations provide highly necessary guidelines for shaping future directions in scientific research at the intersection of applied linguistics, educational psychology, and movement science. To elevate the internal and external validity of this somatic paradigm, future studies must incorporate true experimental research designs featuring randomized control groups. By strictly comparing a treatment group exposed to the collaborative EFL-PE framework against a control

cohort learning identical linguistic units within conventional, desk-bound classrooms, researchers can definitively isolate physical movement and specialized co-teaching as the primary independent variables driving the reduction of communication apprehension. Additionally, expanding the sampling frame to include a multi-center demographic matrix encompassing rural public institutions, private schools, and varied age groups will allow for a comprehensive cross-sectional analysis of how different adolescent sub-populations respond to kinesthetic language scaffolding.

Furthermore, future lines of research should prioritize the execution of longitudinal designs that follow students over an entire academic year or across multiple consecutive curricular cycles. Such studies are critically needed to track the long-term retention of oral verbal fluency and situational self-efficacy, particularly when adolescent learners eventually transition back to traditional, static classroom spaces that lack physical education support. Investigating whether the low-anxiety communicative habits built on the sports court can be successfully transferred and maintained within traditional institutional scripts is vital for establishing the curricular permanence of somatic learning. Finally, a highly promising direction for future inquiry lies in the integration of precise neuroeducational and physiological tracking tools. Rather than relying solely on self-reported psychometric scales like the FLCAS or subjective observational rubrics, future investigations should capture real-time physiological indicators such as heart rate variability (HRV), electrodermal activity, and salivary cortisol or alpha-amylase levels during active communication blocks. Measuring these biochemical and physical stress markers will provide empirical, objective proof of the somatic decompression process, helping to build a comprehensive, interdisciplinary science of embodied language acquisition.

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Conflicto de intereses

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