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Teaching Effectiveness and Deep Learning in EMI Business Courses: The Mediating Role of Academic Buoyancy

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ABSTRACT

Background: The rapid global expansion of English-Medium Instruction (EMI) has transformed higher education, particularly in business programs that require students to master complex disciplinary knowledge while overcoming language-related barriers. EMI students must simultaneously overcome linguistic, cognitive, and cultural barriers, which can increase academic stress, reduce participation, and negatively impact learning outcomes. Despite these challenges, most EMI research has relied on correlational models emphasizing self-efficacy, motivation, or language proficiency, while overlooking psychological constructs that capture students' ability to manage daily academic stressors. Academic buoyancy – the capacity to persist through routine academic setbacks – offers a theoretically robust and practically relevant lens for understanding student adaptation in multilingual learning environments.

Purpose: This study examines academic buoyancy as a mediating mechanism linking teaching effectiveness to deep learning outcomes in EMI business education. Drawing on academic resilience theory, interaction theory, and self-regulated learning theory, we investigated predictors of academic buoyancy and tested whether it mediates the relationship between teaching effectiveness and deep learning.

Method: Data were collected via cross-sectional survey from 215 international students enrolled in EMI business courses at a South Korean university. Multiple regression analysis identified predictors of academic buoyancy, and Hayes' PROCESS macro with 5,000 bootstrap samples tested mediation pathways.

Results: Learner-professor interaction ($\beta = .163$, $p < .001$), teaching effectiveness ($\beta = .146$, $p < .001$), and cognitive engagement ($\beta = .102$, $p = .006$) significantly predicted academic buoyancy, collectively explaining 30.6% of the variance. Mediation analysis demonstrated that academic buoyancy fully mediated the relationship between teaching effectiveness and deep learning (indirect effect = .071, $p < .05$; 95% CI [.012, .130]), with no significant direct effect ($\beta = -.023$, $p > .05$). Notably, peer interactions, content engagement, and metacognitive self-regulation did not significantly predict academic buoyancy after controlling for other variables.

Conclusion: Academic buoyancy served as a key psychological mechanism through which teaching effectiveness influences deep learning in EMI contexts. The findings suggest that effective EMI pedagogy operates primarily by fostering student resilience rather than through direct content transmission, with practical implications for faculty development emphasizing both relational and pedagogical dimensions of instruction.

KEYWORDS

English-medium instruction; academic buoyancy; deep learning; teaching effectiveness; business education

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INTRODUCTION

The worldwide proliferation of English-Medium Instruction (EMI) programs in higher education has generated unique academic pressures for students who must master complex disciplinary content while contending with linguistic and cultural barriers (Macaro et al., 2018). As universities increasingly adopt

EMI to enhance international competitiveness and attract diverse students, understanding the psychological mechanisms that enable student success in these demanding environments has become critically important (Karabay & Durrani, 2024).

EMI students face academic pressures beyond traditional challenges. They must process sophisticated business concepts, engage in critical thinking, and demonstrate academic competence while operating in a second language that can restrict expression and comprehension (Airey, 2016). This dual cognitive load often results in academic stress, reduced participation, and heightened anxiety that can significantly undermine learning and persistence (Evans & Morrison, 2011; Kim & Kim, 2024). Yet a critical question remains: why do some students thrive under these conditions while others struggle? In Korean higher education, EMI programs primarily serve international students, particularly from Central Asia, who must navigate course content in English while adapting to Korean academic culture (Kim, 2020). This study examines this specific international student EMI context, where learners face compounded challenges of linguistic demands, cultural adaptation, and academic socialization.

Despite recognition of these challenges, EMI research has been criticized for theoretical limitations and narrow focus (Curle et al., 2024), with limited integration of psychological constructs explaining student adaptation. This theoretical gap has practical consequences: educators struggle to develop targeted interventions, institutions cannot design effective support systems, and researchers remain focused on documenting problems rather than building predictive models. While studies have identified barriers such as language proficiency deficits and motivational issues (Rose et al., 2020; Thompson et al., 2024), comprehensive frameworks explaining the psychological mechanisms that enable some students to flourish despite these obstacles remain scarce.

Academic buoyancy – students' capacity to overcome routine academic setbacks – represents a psychological construct particularly suited to address this gap. While existing research highlights self-efficacy, motivation, and language anxiety in EMI contexts (Huang, 2024; Thompson et al., 2024; Evans & Morrison, 2011), these constructs examine specific dimensions of student experience rather than the integrated psychological capacity to persist through everyday academic challenges. Academic buoyancy captures this integrated response, emphasizing students' ability to navigate the routine difficulties that characterize EMI learning: linguistic complexity in lectures, difficulty expressing ideas in discussions, and cultural barriers in case studies (Martin & Marsh, 2008). Students with strong academic buoyancy demonstrate greater persistence, engagement, and achievement (Collie et al., 2015; Putwain et al., 2012).

Business education intensifies the need for academic buoyancy. Case-based learning, critical analysis, and professional communication require not only content mastery but also advanced language proficiency and cultural awareness (Tatzl, 2011). These demands intensify in EMI settings, yet research has not examined whether buoyancy mediates the relationship between effective teaching and student success. This study addresses this gap by testing a theoretical framework positioning academic buoyancy as the mediating variable through which effective teaching practices influence learning outcomes in EMI business courses.

THEORETICAL FRAMEWORK

Theoretical Proposition and Integration

Building on recent calls for more theoretically sophisticated EMI research (Curle et al., 2024), this study proposes a theoretical framework positioning academic buoyancy as a central mediating variable through which educational factors influence learning outcomes in EMI business contexts. The framework integrates three complementary theoretical perspectives addressing distinct dimensions of EMI learning: Academic Resilience Theory explains students' psychological capacity to persist through challenges, Interaction Theory identifies the social mechanisms building this capacity, and Self-Regulated Learning Theory describes the cognitive processes through which students manage competing demands. This integration is necessary because EMI learning involves not only individual resilience but also social support structures and strategic cognitive management operating interdependently in multilingual environments.

Academic Resilience Theory

Academic Resilience Theory (Martin & Marsh, 2008, 2020) defines academic buoyancy as students' capacity to overcome everyday academic setbacks and challenges, particularly relevant to EMI settings because it addresses routine rather than major adversities. In EMI business courses, students regularly struggle to understand complex terminology in lectures, articulate ideas during discussions, and interpret culturally-specific case studies (Evans & Morrison, 2011; Kim & Kim, 2020; Macaro et al., 2018), requiring sustained psychological resilience. Academic buoyancy enables students to maintain engagement despite linguistic frustrations, persist through comprehension difficulties, and adapt learning strategies when initial approaches prove insufficient.

Interaction Theory

Interaction Theory (Moore, 1989) complements this psychological perspective by identifying how educational interactions contribute to resilience development, explaining the social conditions fostering buoyancy – what Academic Resilience Theory describes but does not account for. Moore's

framework proposes that learning occurs through three types of interactions: learner-professor interactions provide academic guidance, linguistic modeling, and cultural mediation; learner-learner interactions offer social support and collaborative meaning-making; and learner-content interaction involves strategic engagement with course materials despite dual processing demands. In EMI contexts, these interactions help students develop confidence that challenges can be overcome through help-seeking and strategic effort (Kuo et al., 2014).

Self-Regulated Learning Theory

Self-Regulated Learning theory (Pintrich, 2000; Zimmerman, 2000) completes the integration by describing the cognitive processes through which students manage complex learning demands, balancing content mastery and language comprehension. This theory provides the cognitive dimension missing from the previous two frameworks, explaining strategic mechanisms through which students develop and apply resilience. We position cognitive engagement and metacognitive self-regulation as antecedents to academic buoyancy, theorizing that students' strategic cognitive investment builds the psychological capacity to overcome setbacks (Martin & Marsh, 2020). While reciprocal relationships are theoretically plausible, this directional positioning aligns with evidence that self-regulatory skills can be developed and, when practiced, foster resilience (Zimmerman, 2000). Our cross-sectional design precludes definitive causal determination, making this an important direction for future longitudinal research.

This theoretical integration suggests that academic buoyancy links supportive educational practices with learning outcomes in linguistically challenging environments.

Conceptual Model and Variable Categories

The theoretical framework organizes educational factors into three categories for empirical testing:

(1) Interpersonal Interactions operationalize the social mechanisms identified by Interaction Theory. Learner-professor interaction and learner-learner interaction provide social support, feedback, and collaborative opportunities that build resilience (Moore, 1989; Kuo et al., 2014).
(2) Learning Processes translate Self-Regulated Learning Theory into measurable constructs operationalized at different points in the learning cycle. Learner-content interaction, cognitive engagement, and metacognitive self-regulation represent *active regulatory strategies* – the behavioural and cognitive efforts students employ when engaging with course material – and are positioned as antecedents because they constitute the strategic actions through which students practice persistence and develop resilience (Pintrich, 2000; Zimmerman, 2000). In contrast, deep learning represents a qualitative learning outcome – the conceptual understanding achieved through sustained effort – and is positioned as a consequence of academic buoyancy (Biggs, 1987). This distinction aligns with process models of self-regulated learning (Winne & Perry, 2000; Zimmerman, 2000) that differentiate regulatory activities (what students *do*) from learning achievements (what students *attain*).
(3) Contextual Factors reflect the environmental conditions emphasized by all three theories as necessary for buoyancy development. Teaching effectiveness and classroom social dynamics create supportive environments essential for developing academic buoyancy (Lan et al., 2018).

Mediation Framework and Theoretical Rationale

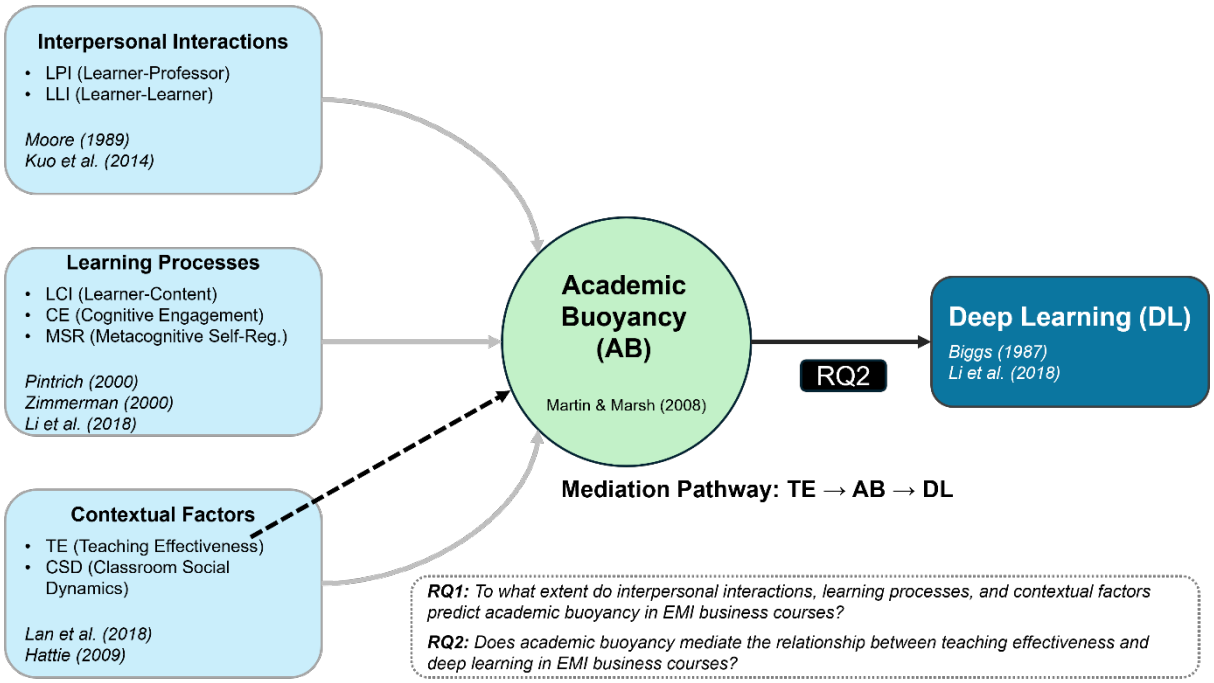
The framework examines whether academic buoyancy mediates the relationship between teaching effectiveness and deep learning outcomes in EMI contexts, challenging conventional assumptions that teaching effectiveness directly produces learning outcomes (Baron & Kenny, 1986). We theorize that in linguistically demanding environments, teaching effectiveness operates primarily by building students' psychological capacity to persist through challenges. Effective EMI teaching creates supportive conditions (clear instruction, appropriate scaffolding, constructive feedback) that help students experience setbacks as temporary and surmountable rather than evidence of inadequacy. These positive experiences build academic buoyancy, enabling students to sustain the cognitive effort required for deep learning despite linguistic barriers (Baron & Kenny, 1986).

This mediation framework draws on established theory: academic buoyancy influences academic outcomes (Martin & Marsh, 2008), teaching quality affects student engagement (Moore, 1989), and psychological factors guide cognitive processes (Pintrich, 2000). EMI students face persistent, everyday challenges, including linguistic complexity, cultural barriers, and dual cognitive processing demands, that require sustained resilience (Airey, 2016; Evans & Morrison, 2011). Among potential mediating mechanisms, academic buoyancy is particularly relevant because it captures this integrated psychological response more comprehensively than domain-specific constructs like motivation and self-efficacy, which prior EMI research has examined primarily as direct predictors (Rose et al., 2020; Thompson et al., 2024).

We focus on teaching effectiveness because it represents a comprehensive, modifiable construct amenable to faculty development interventions (Hattie, 2009), and examine deep learning because it represents conceptual under-

Figure 1

Theoretical Framework for Academic Buoyancy in EMI Business Courses



Note. The framework shows three categories of predictors influencing AB, which mediates the relationship with DL. Within Learning Processes, LCI, CE, and MSR represent regulatory strategies (antecedents), while DL represents learning outcomes (consequence). The highlighted pathway shows the mediation model examined in RQ2, testing whether TE influences DL through AB.

standing rather than surface knowledge (Biggs, 1987). Figure 1 presents the complete framework, showing how educational factors predict academic buoyancy, which mediates the relationship with deep learning.

LITERATURE REVIEW

English-Medium Instruction and Academic Challenges

English-medium instruction (EMI) has experienced substantial global growth, driven by institutional desires to improve university rankings, enhance accreditation status, and attract international students (Macaro et al., 2018). Defined as using English to teach academic subjects in countries where English is not the first language (Macaro, 2018), EMI research has increasingly incorporated psychological constructs (Kim & Thompson, 2022; Thompson et al., 2024), yet the field remains under-theorised regarding mechanisms underlying student success (Curle et al., 2024).

EMI learners must navigate advanced disciplinary material while managing the cognitive load of second-language processing, often resulting in academic stress (Airey, 2016; Macaro et al., 2018). EMI students frequently experience heightened anxiety, reduced participation, and difficulties in articulating complex ideas (Evans & Morrison, 2011; Kim & Kim, 2024). International students undergo complex academic socialization while negotiating linguistic and cultural adaptation challenges, particularly in Asian higher education where Central Asian students form a notable demographic (Kim, 2020). Recent studies identify factors shaping EMI success, including the interplay of language proficiency, academic skills, and motivation (Rose et al., 2020).

Although EMI research has incorporated psychological constructs such as self-efficacy, motivation, self-regulated learning, and anxiety (Evans & Morrison, 2011; Huang, 2024; Thompson et al., 2024; Yuksel et al., 2023), most studies examine these factors in isolation rather than investigating how they interact through mediating variables to shape learning processes. These persistent, everyday challenges create conditions where academic buoyancy becomes critical – students must develop psychological capacity to navigate routine setbacks rather than experiencing occasional difficulties. This gap provides a rationale for examining academic buoyancy as a mediating construct in EMI business education.

Business education presents distinct EMI challenges that intensify the need for academic buoyancy. Case-based pedagogy – central to business instruction – requires students to analyse complex scenarios, articulate strategic recommendations, and engage in critical discussion, demanding advanced language proficiency beyond basic comprehension (Tatzl, 2011). Unlike disciplines with stable technical

vocabularies, business courses involve culturally embedded concepts and context-dependent terminology that international students must interpret while demonstrating analytical thinking in a second language (Sert, 2008). These discipline-specific demands create persistent challenges requiring sustained resilience, making business education particularly relevant for examining how academic buoyancy enables student success.

Academic Buoyancy in Educational Contexts

Since Martin and Marsh's (2008) introduction of academic buoyancy, research has shown that academically buoyant students display greater persistence, engagement, and achievement (Collie et al., 2015; Putwain et al., 2012). Yet most studies have not examined the role of language demands, leaving open questions about how buoyancy operates when students must master content while processing a second language. Emerging research in multilingual contexts highlights both potential and gaps: studies in EFL settings link buoyancy to motivation, interest, and teacher support (Xu & Wang, 2022; Derakhshan & Fathi, 2025), while qualitative EMI research identifies traits such as self-efficacy and self-regulated learning strategies among buoyant students (Diert-Boté & Moncada-Comas, 2024). However, whether academic buoyancy functions as a mediating mechanism, linking teaching practices to learning outcomes, rather than merely as a direct predictor remains unexplored in EMI contexts. Little work has examined predictors of buoyancy development or tested mediation mechanisms in EMI contexts, leaving unanswered how educational practices can systematically foster buoyancy in linguistically challenging environments.

Interpersonal Interactions and Academic Outcomes

Interpersonal interactions significantly influence student engagement, motivation, and academic success, forming a critical foundation for academic buoyancy. *Learner-professor interactions* encompass formal academic exchanges and informal supportive relationships that enhance students' sense of belonging and academic self-efficacy (Chickering & Gamson, 1987; Kim, 2018). These interactions become particularly crucial in diverse learning environments where students may feel isolated, as positive professor relationships enhance help-seeking behaviour and provide social support necessary to overcome academic challenges (Kuo et al., 2014; Pascarella & Terenzini, 2005). Peer interactions provide opportunities for collaborative learning and social support, with research demonstrating that peer support significantly mediates the relationship between student engagement and academic achievement (Johnson & Johnson, 2009; Li, 2024).

In our framework, interpersonal interactions are positioned as antecedents to academic buoyancy because supportive relationships with professors and peers provide social resources students need to persist through EMI challenges. In EMI contexts, professors serve as content experts, language models, and cultural mediators (Airey, 2016), while peer interactions in multicultural classrooms involve navigating diverse educational expectations and communication styles. However, whether these complex interpersonal dynamics specifically contribute to academic buoyancy development in multilingual environments has not been empirically examined.

Learning Processes, Engagement, and Learning Outcomes

Learning processes refer to the internal mechanisms through which students engage with academic material and regulate their learning. In our framework, we distinguish between regulatory processes representing active learning strategies (learner-content interaction, cognitive engagement, metacognitive self-regulation) and learning outcomes reflecting achieved understanding (deep learning).

Learner-content interaction involves engagement with course materials, assignments, and resources, with interaction quality significantly predicting outcomes and satisfaction (Moore, 1989; Bernard et al., 2009). In EMI business courses, language barriers and unfamiliar cultural contexts complicate this engagement, requiring specialized strategies (Tatzl, 2011).

Cognitive engagement encompasses mental effort, attention, and strategic thinking, bridging motivation and learning outcomes (Li et al., 2018).

Metacognitive self-regulation, including planning, monitoring, and evaluating learning, enables students to adapt strategies based on task demands and feedback, supporting persistence and higher achievement (Pintrich et al., 1991; Winne & Perry, 2000). In EMI contexts, students must monitor both content comprehension and language processing simultaneously (Airey, 2016), making metacognitive skills critical for academic buoyancy (Martin & Marsh, 2008, 2020).

We position *cognitive engagement* and *metacognitive self-regulation* as antecedents to academic buoyancy because consistent strategic effort builds confidence in managing challenges. *Deep learning*, in contrast, represents an outcome of buoyancy – sustained resilience enables the persistent engagement required for conceptual understanding. *Deep learning*, focused on understanding meaning and connecting concepts, leads to superior comprehension and knowledge transfer compared to surface approaches (Biggs, 1987). These processes are influenced by teaching quality, student motivation, and learning environment characteristics (Li et al., 2018). Yet, research has not examined how regulatory processes contribute to academic buoyancy, or how buoyancy enables deep learning outcomes, in EMI contexts

where students must sustain sophisticated engagement despite linguistic and cultural challenges.

Contextual Factors in Educational Environments

Contextual factors significantly influence student outcomes, though their mechanisms remain undertheorized in multilingual settings. Teaching effectiveness encompasses clear communication, appropriate challenge, constructive feedback, and supportive classroom climate (Chickering & Gamson, 1987; Lan et al., 2018), with strong effects on engagement and achievement (Hattie, 2009). However, most research focuses on monolingual contexts where instructors and students share linguistic and cultural backgrounds.

EMI environments complicate traditional teaching models, as instructors must simultaneously deliver content, provide language support, and mediate cultural differences (Airey, 2016; Evans & Morrison, 2011). We focus on *teaching effectiveness* as a predictor of academic buoyancy and potential indirect pathway to deep learning because effective instruction may operate by building students' psychological capacity to persist rather than through direct knowledge transmission – a mechanism particularly relevant when linguistic barriers complicate traditional pedagogical approaches.

Classroom social dynamics also influence engagement, motivation, well-being, and achievement (Cohen et al., 2009; Johnson & Johnson, 2009; Lan et al., 2018). However, the assumption that positive dynamics universally benefit students may not hold in EMI contexts, where cultural differences in participation norms can shape how social environments influence academic buoyancy[1]. Despite the recognized importance of these factors, little research has examined how effective EMI teaching and positive classroom dynamics specifically foster academic buoyancy.

Mediation Mechanisms in Educational Research

Mediation analysis highlights that educational practices often influence learning outcomes through intermediate psychological mechanisms rather than direct pathways (Baron & Kenny, 1986; MacKinnon et al., 2002). Academic buoyancy has emerged as an important mediating variable, shown to mediate relationships between perceived teacher support and academic achievement (Yun et al., 2018), social support and academic outcomes (Granziera et al., 2022), and school belonging and performance[2]. However, its mediating role in EMI settings remains unexplored, despite theoretical arguments that multilingual learning environments may operate via different psychological pathways than traditional contexts. This gap limits understanding of how effective EMI practices translate into learning outcomes and constrains development of evidence-based interventions for linguistically diverse students.

Research Gaps and Study Rationale

Despite growing research on academic buoyancy and EMI education, significant gaps remain at their intersection. Most academic buoyancy research has occurred in first-language settings, leaving its operation in EMI environments largely unexplored. While EMI studies have documented student challenges including language proficiency and motivational issues (e.g., Rose et al., 2020; Kim & Kim, 2024; Kim & Thompson, 2022), they have not examined the psychological mechanisms enabling some students to thrive under this condition.

Recent work by Diert-Boté and Moncada-Comas (2024) represents one of the first studies examining academic buoyancy specifically in EMI contexts, identifying characteristics of highly buoyant students, such as high self-efficacy and effective self-regulated learning strategies. However, this study does not investigate predictive factors contributing to buoyancy development or test mediation mechanisms through which educational factors influence learning outcomes. Comprehensive models examining how interpersonal interactions, learning processes, and contextual factors work together to influence student outcomes in EMI contexts remain limited.

This study addresses these gaps by examining predictors of academic buoyancy in EMI contexts and testing its mediating role between teaching effectiveness and deep learning outcomes. Based on the theoretical framework and gaps identified in the literature review, this study addresses the following research questions:

RQ1: To what extent do interpersonal interactions, learning processes, and contextual factors predict academic buoyancy in EMI business courses?

RQ2: Does academic buoyancy mediate the relationship between teaching effectiveness and deep learning in EMI business courses?

[1] Bostwick, K. C. P., Martin, A. J., Burns, E., & Collie, R. J. (2023, September 18). What helps students cope with academic setbacks? Our research shows a sense of belonging at school is key. *The Conversation*. https://theconversation.com/what-helps-students-cope-with-academic-setbacks-our-research-shows-a-sense-of-belonging-at-school-is-key-213362

[2] Ibid.

METHOD

Research Design

This study employed a quantitative cross-sectional survey design to investigate the relationships between interpersonal interactions, learning processes, contextual factors, academic buoyancy, and deep learning outcomes in EMI business education. The research utilized a correlational approach to examine predictive relationships and mediation effects among the study variables.

Participants and Setting

Data were collected from 215 university students enrolled in EMI business courses at a South Korean university. The sample comprised both business and engineering majors, with approximately 60% male and 40% female participants. The majority of participants (approximately 70%) were in their third and fourth years of study. All participants were international students, primarily from Central Asian countries including Uzbekistan and Kyrgyzstan, with additional exchange students from European and Middle East countries. The Central Asian student population represents a significant demographic in Korean EMI programs (Kim, 2020) and faces similar challenges to international students in other EMI contexts, including navigating academic content through a second language while adapting to different pedagogical approaches (Macaro et al., 2018).

Regarding English language proficiency, participants demonstrated varied IELTS levels with distribution that indicates that approximately 65% of participants possessed high proficiency (IELTS 7+), while 35% had intermediate proficiency (IELTS 6-6.5). Table 1 provides a detailed breakdown of participant demographics.

Data Collection Instrument

A comprehensive survey instrument measured nine constructs organized according to our theoretical framework's three categories: Interpersonal Interactions (learner-professor and learner-learner), Learning Processes (learner-content interaction, cognitive engagement, metacognitive self-regulation, and deep learning), and Contextual Factors (teaching effectiveness and classroom social dynamics), with academic buoyancy as the mediating variable. Within Learning Processes, we distinguish between regulatory strategies (cognitive engagement and metacognitive self-regulation) positioned as antecedents because consistent use builds resilience capacity, and learning outcomes (deep learning) positioned as a consequence because resilience enables sustained cognitive effort. This distinction aligns with Self-Regulated Learning Theory's differentiation between learning processes and products (Winne & Perry, 2000; Zimmerman, 2000).

Table 1

Demographic Characteristics of Study Participants (N = 215)

Variables	*N*	%
Nationality		
International	212	98.60
Local	3	1.40
Gender		
Female	87	40.47
Male	128	59.53
Year		
Second	45	20.93
Third	99	46.05
Fourth	71	33.02
Major		
Business	177	82.33
Engineering	33	15.34
Other (Communications, etc.)	5	2.33
L2 English proficiency (IELTs)		
Lev. 8	28	13.02
Lev. 7.5	49	22.79
Lev. 7	62	28.84
Lev. 6.5	54	25.12
Lev. 6	22	10.23

The questionnaire incorporated validated scales from established literature (see Table 2), administered in English consistent with the EMI environment and established EMI research practice. Scale adaptation involved ensuring clarity and cultural appropriateness for Central Asian student populations through pilot testing (described below), with modifications addressing cultural context while preserving conceptual equivalence. The survey included the following measures:

Interpersonal Interactions

Two forms of interaction central to Interaction Theory were measured using validated scales from Kuo et al. (2014).

(1) Learner-Professor Interaction (LPI) – quality and frequency of learner-professor communications, capturing both academic and relational dimensions of professor interaction, particularly relevant in EMI contexts where professors serve as content experts, language models, and cultural mediators (Kuo et al., 2014). (Sample item: "I had numerous interactions with the professor").
(2) Learner-Learner Interaction (LLI) – peer-to-peer collaborative learning and social connections, measuring interaction quality in multicultural EMI classrooms where students navigate diverse communication styles and educational backgrounds (Kuo et al., 2014). (Sample item: "I commented on other students' thoughts and ideas").

Learning Processes

Three constructs operationalized students' engagement with course materials and regulatory learning strategies:

(1) Learner-Content Interaction (LCI) – engagement with course materials and academic content, assessing strategic interaction quality rather than mere exposure to materials, particularly important when students must process complex business concepts in a second language (Kuo et al., 2014). (Sample item: "Offline/Online course materials stimulated my interest for this course").
(2) Cognitive Engagement (CE) – students' mental investment and effort in learning activities. The scale emphasizes active thinking and discovery-oriented learning, particularly appropriate for case-based business pedagogy (Lan et al., 2018). (Sample item: "Course activities ignited my interest for discovery").
(3) Metacognitive Self-Regulation (MSR) – ability to plan, monitor, and regulate learning processes, measured through the widely-validated Motivated Strategies for Learning Questionnaire subscale that has demonstrated reliability across diverse educational contexts including EMI settings where students must manage both content and language demands (Pintrich et al., 1991). (Sample item: "When I study for this class, I set goals for myself in order to direct my activities in each study period").

In accordance with Self-Regulated Learning Theory, CE and MSR were conceptualized as antecedent regulatory processes**,** reflecting the strategic behaviors students employ during learning rather than learning outcomes themselves.

Contextual Factors

Two dimensions of the instructional environment were included:

(1) Teaching Effectiveness (TE) – quality and effectiveness of instructional methods, encompassing clear communication and supportive climate dimensions identified as critical for EMI instruction where professors must balance content delivery with language support (Lan et al., 2018). (Sample item: "The professor effectively communicated the principal themes of the course").
(2) Classroom Social Dynamics (CSD) – social climate and interpersonal relationships within the learning environment, assessing the supportive atmosphere essential for students to take intellectual risks despite linguistic limitations (Lan et al., 2018). (Sample item: "The classroom environment serves as an ideal space for engaging with others").

Mediating Variable

Academic Buoyancy (AB) was measured using Martin and Marsh's (2008) Academic Buoyancy Scale, selected for its explicit focus on students' capacity to manage everyday academic setbacks. This property makes it particularly appropriate for EMI settings, where students routinely confront challenges related to linguistic complexity, culturally unfamiliar content, and second-language performance anxiety. (Sample item: "I'm good at dealing with setbacks (e.g., bad mark, negative feedback on my work"). The scale demonstrated excellent internal consistency in the present sample.

Outcome Variable

Deep Learning (DL), assessed using Li et al.'s (2018) validated scale, represents students' approach to learning that emphasizes understanding, meaning-making, and conceptual comprehension rather than surface-level memorization. We selected DL as our primary outcome to measure learning quality rather than performance indicators such as grades, consistent with our theoretical focus on learning processes in linguistically demanding EMI environments. (Sample item: «After studying this course, I improved my professional knowledge and skills»).

To ensure cultural appropriateness for Central Asian students, the survey underwent pilot testing with 30 international students matching the demographic profile of the target population. The procedure included: (1) survey administration, (2) cognitive interviews (n=10) to verify item interpretation, (3) review by three EMI instructors to assess cultural appropriateness, and (4) reliability analysis. Based on feedback, minor revisions improved clarity (e.g., simplifying three MSR items) while preserving conceptual integrity. Pilot reliability analysis confirmed acceptable internal consistency (α > .70). Post-hoc reliability analyses with the full sample demonstrated strong coefficients across all constructs (see Table 2), indicating robust validity in this EMI context.

Data Collection Procedure

Survey data were collected during regular class sessions with instructor permission and university Institutional Review Board approval. Participation was voluntary, and students were informed about the study's purpose and their rights. Data were collected anonymously.

Data Analysis

Data analysis was conducted using IBM SPSS Statistics, Version 29 (IBM Corp.). Preliminary analyses examined data quality, including missing data patterns, outliers, and assumptions for multivariate analyses. Adequate sample size was verified, and data were checked for normality, linearity, and multicollinearity. Descriptive statistics were calculated for all study variables.

To address *Research Question 1 (RQ1)*, multiple regression analysis examined the extent to which interpersonal interactions, learning processes, and contextual factors predict *AB* while controlling for demographic variables (gender, year of study, major, and English proficiency). The analysis included 11 predictor variables: four demographic controls and seven theoretical predictors.

To address *Research Question 2 (RQ2)*, mediation analysis using Hayes' (2017) PROCESS macro (Model 4) with 5,000 bootstrap samples examined whether *AB* mediates the relationship between *TE* and *DL* outcomes. We focused the mediation analysis on teaching effectiveness rather than other professor-related predictors (e.g., learner-professor interaction) because teaching effectiveness represents a broader, more comprehensive construct encompassing pedagogical practices, instructional design, and classroom management – dimensions amenable to faculty development interventions (Hattie, 2009). Deep learning was selected as the outcome variable because it represents learning quality and conceptual understanding rather than performance indicators such as grades (Biggs, 1987). The analysis followed established procedures for testing indirect effects, examining the significance of the mediated pathway.

Additional analyses included correlation analyses for bivariate relationships among variables and reliability analyses for internal consistency of measurement scales. Statistical significance was set at $p < .001$, with effect sizes reported to indicate practical significance of findings.

RESULTS

Preliminary Analyses

Descriptive statistics and intercorrelations among all study variables are presented in Tables 3 and 4. Students demonstrated relatively high levels across all measured variables. *AB* showed a mean of 4.51 (SD = .27), indicating moderate to high resilience. *DL* showed a mean of 4.60 (SD = .49), suggesting that students engaged in moderate to deep approaches to learning.

Table 2

Summary of Variables, Sources, and Reliability Coefficients

Factor	Variable	Source	# of Items	Cronbach's Alpha α
	Demographics		4	
Interpersonal Interactions	Learner-Professor Interaction (LPI)	Kuo et al. (2014)	5	.837
	Learner-Learner Interaction (LLI)	Kuo et al. (2014)	5	.748
Learning Processes	Learner-Content Interaction (LCI)	Kuo et al. (2014)	3	.838
	Cognitive Engagement (CE)	Lan et al. (2018)	5	.837
	Metacognitive Self-Regulation (MSR)	Pintrich et al. (1991)	10	.758
Context	Teaching Effectiveness	Lan et al. (2018)	7	.896
	Classroom Social Dynamics (CSD)	Lan et al. (2018)	4	.851
Mediator	Academic Buoyancy (AB)	Martin & Marsh (2008)	4	.929
Outcome	Deep Learning (DL)	Li et al. (2018)	11	.913

Bivariate correlations revealed that *AB* was significantly and positively correlated with *LPI* (r = .37, p < .001) and *TE* (r = .37, p < .001), both showing equally strong relationships. *CE* (r = .25, p < .001) and *MSR* (r = .22, p = .003) also showed moderate positive correlations with *AB*. Among demographics, only gender showed a significant correlation (r = -.15, p = .037). Year of study, major, and English proficiency were not significantly correlated with *AB.*

DL was significantly correlated with *AB* (r = .19, p = .007), *LPI* (r = .20, p = .005), and *CE* (r = .19, p = .010). Notably, *TE* did not directly correlate with *DL* (r = .05, p = .486), suggesting indirect effects through academic buoyancy – consistent with the proposed mediation model.

TE showed a significant positive correlation with *MSR* (r = .21, p = .003), suggesting that effective teaching practices may

Table 3

Descriptive Statistics for All Study Variables

Variable	*N*	*M*	*SD*
AB	215	4.51	.27
LPI	215	4.55	.45
LLI	215	4.19	.54
LCI	215	4.27	.56
TE	215	4.76	.52
CSD	215	4.14	.63
CE	215	4.42	.49
MSR	215	4.34	.50
DL	215	4.60	.49
Gender	215	.62	.49
Year	215	3.09	.72
Major	215	1.21	.48
English Proficiency	215	6.93	.61

Table 4

Pearson Correlation Coefficients Among All Study Variables

#	Variable	1	2	3	4	5	6	7	8	9	10	11	12	13
1	Gender	-												
2	Year	.01	-											
3	Major	.05	.03	-										
4	EP	-.01	.02	.01	-									
5	LPI	-.12	-.11	-.02	.10	-								
6	LLI	-.12	-.04	.06	.05	.13	-							
7	LCI	-.10	-.01	-.16*	-.10	.06	.01	-						
8	TE	.00	.00	.07	-.01	.17*	.07	.01	-					
9	CSD	.06	-.02	-.10	-.04	-.02	-.01	.17*	.02	-				
10	CE	.07	.06	.01	.12	.14	.08	.06	.10	-.07	-			
11	MSR	-.01	-.09	.04	-.01	.10	-.01	.09	.21**	.03	.15*	-		
12	AB	-.15*	-.04	.06	.08	.37**	.11	.06	.37**	.09	.25**	.22**	-	
13	DL	-.06	-.04	-.11	.05	.20**	.13	-.10	.05	.07	.19**	-.05	.19**	-

Note. N = 215. EP = English Proficiency. LPI = Learner-Professor Interaction; LLI = Learner-Learner Interaction; LCI = Learner-Content Interaction; TE = Teaching Effectiveness; CSD = Classroom Social Dynamics; CE = Cognitive Engagement; MSR = Metacognitive Self-Regulation; AB = Academic Buoyancy; DL = Deep Learning.
*p < .05. **p < .01 (two-tailed).

foster students' ability to monitor and regulate their learning processes. Correlations among other theoretical predictors were low to moderate (r = -.16 to r = .22), indicating minimal multicollinearity concerns. Variance inflation factor (VIF) values confirmed this, with all theoretical predictors (all < 1.10, well below the conventional threshold of 5.0).

Multiple Regression Analysis Predicting Academic Buoyancy

Multiple regression analysis examined predictors of *AB* while controlling for demographic variables (gender, year of study, major, and English proficiency). The overall model was statistically significant, F(11, 203) = 7.14, p < .001, with R = .553. The model explained 30.6% of the variance in *AB* (R^2 = .306; adjusted R^2 = .263), indicating substantial explanatory power in educational research contexts. Table 5 presents the complete multiple regression analysis results.

Among demographic control variables, only gender significantly predicted *AB* (β = -0.08, p = .034), with male students reporting slightly lower levels. Year of study, major, and English proficiency were not significant predictors.

After controlling for demographic variables, three theoretical predictors significantly predicted *AB*. *LPI* was the strongest predictor (β = .163, t = 4.04, p < .001), followed by *TE* (β = .146, t = 4.25, p < .001). *CE* also significantly predicted *AB* (β = .102, t = 2.79, p = .006).

Four theoretical variables did not significantly predict *AB* after controlling for demographics: *LLI* (β = .011, t = 0.33, p = .744), LCI (β = .002, t = 0.06, p = .954), *CSD* (β = .05, t = 1.80, p = .073), and *MSR* (β = .053, t = 1.48, p = .140).

Mediation Analysis of Academic Buoyancy

To address RQ2, a mediation analysis was conducted using Hayes' (2017) PROCESS macro (Model 4) with 5,000 bootstrap samples. *TE* served as the independent variable, *AB* as the mediator, and *DL* as the dependent variable.

Table 5

Multiple Regression Analysis Predicting Academic Buoyancy

Model Summary[a]

Model	*R*	*R^2*	*Adjusted R2*	*SE*	*F*	*df1*	*df2*	*p*
1	.553[a]	**.306**	.263	.234	7.14	11	203	**<.001**

Note. a. Predictors: (Constant), MSR, CSD, LLI, LCI, TE, CE, LPI
b. Dependent Variable: AB

Regression Coefficients

Variable	*β*	*SE*	*t*	*p*	*VIF*
Control Variables					
Gender	-.077*	.036	-2.14	.034	2.60
Year of Study	-.002	.024	-0.10	.920	6.63
Major	.033	.036	0.90	.371	6.16
EP	.015	.029	0.52	.607	1.04
Theoretical Predictors					
LPI	.163***	.040	4.04	<.001	1.09
LLI	.011	.033	0.33	.744	1.04
LCI	.002	.032	0.06	.954	1.08
TE	.146***	.034	4.25	<.001	1.08
CSD	.050	.028	1.80	.073	1.05
CE	.102**	.037	2.79	.006	1.08
MSR	.053	.036	1.48	.140	1.09

Note. N = 215. β = standardized regression coefficient; SE = standard error; VIF = variance inflation factor. *p < .05. **p < .01. ***p < .001.

Preliminary Correlations. As shown in Table 4, *TE* demonstrated a significant and positive correlation with *AB* (r = 0.37, p < .001), while showing no correlation with *DL* (r = .05, p = .486). *AB* significantly correlated with *DL* (r = .19, p = .007), suggesting its potential mediating role.

Path Analysis. The mediation analysis revealed significant relationships across the proposed pathways (see Figure 2).

Path a (TE → AB) demonstrated a significant positive relationship (β = .195, SE = .036, t = 5.446, p < .001), indicating that higher levels of *TE* significantly predicted increased *AB* among EMI business students. The model explained 13.6% of the variance in *AB* (R^2 = .136).

Path b (AB → DL | TE) also showed a significant positive relationship (β = .364, SE = .138, t = 2.633, p < .01), demonstrating that students with higher *AB* were significantly more likely to engage in *DL* approaches.

Path c (TE → DL total) was weak and non-significant (β = .048, SE = .069, t = .698, p > .05), explaining only 0.3% of the variance in *DL* (R^2 = .003).

Path c' (TE → DL direct | AB), when *AB* was included as a mediator, became even weaker and remained non-significant (β = -.023, SE = .073, t = -.313, p > .05).

Mediation Effects. The indirect effect through *AB* was statistically significant (β = .071, Z = 2.370, p < .05, 95% CI [.012, .130]), indicating that *TE* influences *DL* through *AB*. The model predicting *AB* from *TE* explained 13.6% of the variance (R^2 = .136, p < .001), while the combined model predicting *DL* from *TE* and *AB* explained 3.8% of the variance (R^2 = .038). The analysis revealed evidence of complete statistical mediation, as indicated by: (1) a significant indirect effect through *AB* (β = .071, 95% CI [.012, .130]), (2) a non-significant direct effect when the mediator was controlled (β = -.023, p > .05), and (3) the direct effect becoming weaker and slightly negative when *AB* was included in the model. Table 6 presents the complete mediation analysis results.

DISCUSSION

This study examined academic buoyancy as a psychological mechanism linking teaching effectiveness to deep learning outcomes among international students in EMI business courses. Positioning academic buoyancy within an integrated framework informed by Academic Resilience Theory (Martin & Marsh, 2008, 2020), Interaction Theory (Moore, 1989), and Self-Regulated Learning Theory (Pintrich, 2000; Zimmerman, 2000), we tested whether buoyancy mediates the relationship between teaching quality and learning approaches in linguistically demanding environments. Our findings reveal that academic buoyancy operates as a complete mediator, with teaching effectiveness influencing deep learning primarily by fostering students' capacity to persist through routine academic challenges rather than through direct instructional transmission. Below we interpret these findings, examine their implications, and situate them within existing EMI research.

The Centrality of Professor-Related Factors in Building Academic Buoyancy

The emergence of learner-professor interaction and teaching effectiveness as the strongest predictors reveals a fundamental characteristic of resilience development in multilingual environments: students' capacity to overcome

Figure 2

Academic Buoyancy Mediation Model

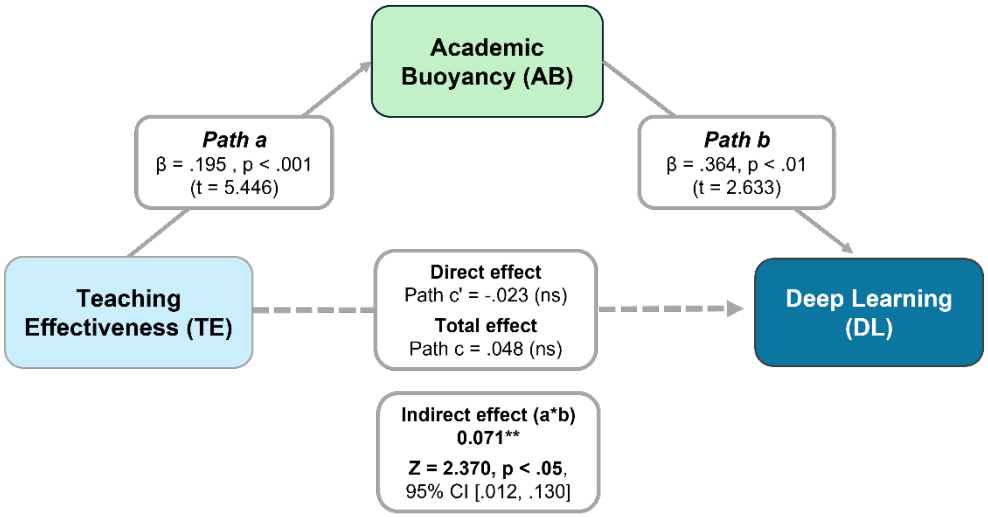


Table 6

Complete Mediation Analysis Results

Path Coefficients

Path	Relationship	Coefficient (β)	Std. Error	t-statistic	Significance
a	TE → AB	.195	.036	5.446	p < .001
b	AB → DL	.364	.138	2.633	p < .01
c	TE → DL	.048	.069	.698	p > .05
c'	TE → DL|AB	-.023	.073	-.313	p > .05

Mediation Effects

Effect Type	Coefficient	Test Statistic	95% CI	Significance
Total effect (c)	.048	t = .698	[-.088, .184]	ns
Direct effect (c')	-.023	T = -.313	[-.166, .121]	ns
Indirect effect (a x b)	.071	Z = 2.370	[.012, .130]	p < .05
STATISTICAL MEDIATION: AB statistically mediates TE → DL relationship				

Model Fit Statistics

Model	R^2	Variance Explained	Sample Size
TE → AB	.136	13.60%	215

routine academic setbacks depends primarily on professor relationships and pedagogical practices. This pattern suggests that in EMI contexts with persistent linguistic and cultural challenges, professors play a more central role in resilience development than in traditional monolingual settings (Airey, 2016; Kim, 2018).

This finding illuminates a specific developmental mechanism. When professors provide frequent, supportive interactions – offering clarification of complex concepts, checking comprehension regularly, providing constructive feedback that addresses both content and language, and creating safe spaces for expressing confusion – they demonstrate that confusion is normal in second-language learning and that persistence leads to understanding (Martin & Marsh, 2008, 2020). Through accumulated experiences of supported problem-solving, students develop confidence in handling future setbacks, the essence of academic buoyancy. Similarly, teaching effectiveness creates conditions where students experience success despite linguistic limitations. Effective EMI teaching provides structure and support enabling successful navigation of challenges rather than eliminating them (Macaro et al., 2018). This aligns with Li et al.'s (2023) demonstration that teacher support predicts achievement through academic buoyancy, extending this finding to EMI contexts where teacher support encompasses both content expertise and linguistic scaffolding.

The dominance of professor-related factors over peer and contextual variables suggests that EMI resilience develops primarily through vertical (student-professor) rather than horizontal (student-student) relationships, with important implications for resource allocation and intervention design.

The Role of Cognitive Engagement in Resilience Development

Beyond professor-related factors, cognitive engagement emerged as a significant predictor of academic buoyancy, supporting self-regulated learning theories that emphasize active mental investment in building psychological capacity (Pintrich, 2000; Zimmerman, 2000). Students who consistently engage deeply with course material – thinking critically, making connections, pursuing understanding rather than memorization – develop confidence in handling academic challenges, a relationship particularly meaningful in EMI contexts where dual cognitive processing demands might discourage deep engagement (Tatzl, 2011).

The findings suggest a developmental mechanism: students who maintain cognitive engagement despite linguistic difficulties experience successful comprehension, building confidence that encourages further engagement and deeper resilience (Collie et al., 2015; Derakhshan & Fathi, 2025). The EMI business classroom, with its emphasis on case analysis

and critical discussion, provides rich opportunities for such engagement when properly structured. This pattern highlights a critical pedagogical principle: EMI instruction should not simplify content or reduce cognitive demands in response to linguistic challenges, but rather scaffold cognitive engagement to remain accessible despite those challenges. When appropriately supported, activities promoting discovery, problem-solving, and analytical thinking both facilitate learning and build psychological capacity for persisting through future challenges.

Interpreting Non-Significant Predictors in EMI Contexts

Four theoretically relevant variables (peer interaction, learner–content interaction, classroom social dynamics, and metacognitive self-regulation) did not significantly predict academic buoyancy after accounting for other factors, revealing meaningful insights into EMI learning dynamics.

First, the non-significance of peer interaction contrasts with research in monolingual settings where peer collaboration reliably supports achievement (Johnson & Johnson, 2009; Li, 2024). In EMI classrooms with heterogeneous proficiency levels and culturally diverse communication norms (Kim, 2020), peer interactions may impose additional cognitive demands rather than alleviate them. This interpretation is particularly relevant to our sample of international students in Korea, the majority from Central Asia, where educational traditions emphasize hierarchical teacher-student relationships over peer collaboration (Xu et al., 2023). The finding aligns with evidence that highly buoyant EMI students focus on self-regulated strategies rather than peer-dependent approaches (Diert-Boté & Moncada-Comas, 2024) and rely more on professor scaffolding for complex concepts (Huang, 2024).

Second, the absence of effects for learner-content interaction and classroom dynamics suggests that general environmental affordances are insufficient to support resilience without individualized professor mediation. Even high-quality materials cannot compensate for linguistic misunderstanding when professor support is lacking.

Third, the non-significance of metacognitive self-regulation, despite theoretical importance (Pintrich, 2000; Zimmerman, 2000), may reflect the high cognitive burden of simultaneously self-regulating content processing and second-language comprehension (Airey, 2016). Alternatively, this may indicate a developmental sequence where students must first develop foundational resilience before metacognitive strategies become effective, or the relationship may be reciprocal, with our cross-sectional design capturing only one timepoint in a bidirectional process.

Collectively, these non-significant findings reveal that academic buoyancy in EMI contexts develops primarily through individualized, professor-mediated support and active cognitive engagement rather than through peer collaboration, general environmental conditions, or self-directed metacognitive strategies.

Academic Buoyancy as a Mediating Mechanism

The mediation analysis reveals the study's most consequential finding: teaching effectiveness does not directly predict deep learning but exerts its influence entirely through academic buoyancy. This complete mediation pattern departs from traditional assumptions that instructional clarity and design directly enhance conceptual understanding (Hattie, 2009; Biggs, 1987). In monolingual contexts, teaching effectiveness typically demonstrates substantial direct effects on learning outcomes. Our EMI findings suggest a fundamentally different mechanism: effective teaching builds students' psychological capacity to persist through challenges, and this persistence capacity enables the sustained cognitive engagement required for deep learning. This is particularly striking given that teaching effectiveness showed virtually no bivariate correlation with deep learning ($r=.05$, $p=.486$), yet demonstrated a significant indirect pathway through buoyancy, suggesting that traditional teaching quality metrics will fail to predict EMI learning outcomes without considering resilience development.

The mechanism aligns with Academic Resilience Theory (Martin & Marsh, 2008) given EMI challenges. Clear explanation cannot eliminate the cognitive load of processing complex business concepts in a second language. What effective teaching accomplishes is creating conditions where students experience challenges as temporary obstacles rather than insurmountable barriers. These accumulated experiences of «struggle leading to success» build academic buoyancy, enabling students to persist through the extended cognitive effort deep understanding requires (Martin & Marsh, 2008; Li et al., 2023).

This pattern has important implications for conceptualizing effective EMI pedagogy. Traditional models emphasize content delivery and instructional clarity – treating the teacher's role as primarily knowledge transmission. Our findings suggest that in EMI contexts, psychological resource development is equally or more important. Effective EMI teachers design learning experiences that build students' confidence in overcoming challenges, not merely those who explain content clearly or design engaging activities.

Gender Differences

Although gender was not a primary focus of the study, male students reported slightly lower academic buoyancy than female students. While the small effect size warrants cautious interpretation, this pattern suggests several possible explanations worth exploring. Female international students may develop more proactive support networks that buffer against setbacks, or male students entering business programs with confidence based on home-country experiences may encounter larger gaps between expected and actual performance when navigating content in a second language (Martin & Marsh, 2008; Putwain et al., 2012). Future research should employ qualitative methods to explore these gender-specific EMI experiences and determine whether targeted support interventions are warranted.

Integration with Recent EMI Research

The findings advance EMI scholarship by demonstrating that academic buoyancy operates as a critical mediating mechanism through which teaching practices translate into learning outcomes, a pattern that extends prior work emphasizing linguistic proficiency, affective variables, and motivation as direct predictors (Rose et al., 2020; Thompson et al., 2024; Macaro et al., 2018). The quantitative evidence that cognitive engagement predicts buoyancy converges with Diert-Boté and Moncada-Comas's (2024) qualitative identification of commitment and sustained effort among highly buoyant EMI students, while the non-significance of peer interactions aligns with ongoing discussions about collaborative learning challenges in linguistically diverse classrooms (Zheng & Choi, 2024). By integrating Academic Resilience Theory, Interaction Theory, and Self-Regulated Learning Theory, the study suggests that psychological resilience mechanisms may be more central to EMI success than previously recognized.

Theoretical and Practical Implications

This study makes three distinct theoretical contributions. First, by demonstrating that academic buoyancy mediates the teaching-learning relationship in EMI contexts, it advances theoretical sophistication in a field critiqued as «largely insular and under-theorised» (Curle et al., 2024). Second, the finding that teaching effectiveness shows no direct relationship with deep learning but operates entirely through academic buoyancy demonstrates that theoretical models developed in monolingual settings require adaptation for EMI contexts. Third, by integrating Academic Resilience Theory, Interaction Theory, and Self-Regulated Learning Theory, the study provides a comprehensive framework for multilingual educational settings.

These theoretical insights translate into four practical priorities for EMI programs. Faculty development should move beyond content delivery and language accommodation to explicitly address resilience-building: creating low-stakes opportunities for productive struggle, framing linguistic difficulties as normal temporary obstacles, and delivering feedback addressing both content and language. Professor-student interaction quality requires structural investment – given that learner-professor interaction was the strongest buoyancy predictor, programs should ensure manageable class sizes, adequate office hours, and technologies enabling asynchronous communication. Curricular design should emphasize cognitive engagement through scaffolded activities: case analyses with pre-reading support, problem-solving with structured guidance, and discussion protocols allowing processing time. Assessment and evaluation should measure resilience-building alongside content delivery, tracking academic buoyancy alongside traditional outcomes. These priorities represent a shift in EMI pedagogy: from accommodating linguistic limitations to actively building the psychological capacity that enables deep learning.

Methodological Contributions

This study advances methodological rigor in EMI research through three approaches. First, the use of Hayes' (2018) PROCESS macro with bootstrapping procedures (5,000 resamples) represents advancement beyond the correlation and regression-based analyses dominating EMI research. This approach tests specific psychological pathways rather than simple correlations, revealing that teaching effectiveness showed virtually no bivariate relationship with deep learning ($r=.05$, $p=.486$) yet demonstrated significant indirect effects through buoyancy – evidence that would be missed using traditional analytic approaches. Second, examining multiple predictors simultaneously within a comprehensive theoretical framework reveals the relative importance of different educational factors. This demonstrated that professor-related factors outweigh peer interactions and contextual variables in predicting buoyancy, providing empirical guidance for prioritizing interventions. Testing comprehensive models rather than bivariate relationships demonstrates a pathway toward more sophisticated EMI research designs. Third, focusing on learning quality (deep learning) rather than performance indicators (grades) represents a methodologically principled choice aligned with theoretical interest in learning processes. In EMI contexts, grades may reflect linguistic proficiency as much as conceptual understanding, making deep learning approaches a more valid indicator of meaningful educational outcomes.

Limitations and Future Directions

Several limitations suggest important directions for future research. First, the cross-sectional design establishes statistical mediation patterns but cannot confirm causal directions. Longitudinal research is essential to validate the developmental sequence we propose and examine whether buoyancy and cognitive engagement develop in tandem or

sequentially. Second, the predominantly Central Asian sample limits generalizability. While this population represents a significant demographic in Asian EMI programs, cross-cultural replication is essential. Different cultural backgrounds may influence which factors predict buoyancy development, particularly regarding peer interaction effects. Finally, while we examined teaching effectiveness as the predictor in our mediation model, given that learner-professor interaction was the strongest predictor of buoyancy, future research should examine whether relationship quality operates similarly through academic buoyancy to influence learning outcomes. Comprehensive models should also examine how buoyancy relates to other psychological constructs prominent in EMI research (e.g., self-efficacy, motivation, and language anxiety) to clarify academic buoyancy's unique contribution.

CONCLUSION

This study establishes academic buoyancy as a key psychological mechanism linking teaching quality to learning depth in EMI contexts. The mediation analysis revealed that teaching effectiveness influences deep learning primarily by fostering students' capacity to navigate academic challenges rather than through direct instructional transmission, demonstrating that effective EMI pedagogy operates by building psychological resilience.

Three distinct contributions emerge. Theoretically, the study identifies professor-related factors (learner-professor interaction and teaching effectiveness) as dominant predictors of academic buoyancy, with cognitive engagement also contributing significantly. The non-significance of peer interactions, content engagement, classroom dynamics, and metacognitive self-regulation challenges conventional assumptions, suggesting that EMI resilience develops primarily through quality instruction and individual cognitive investment rather than peer-mediated processes. Methodologically, employing Hayes' PROCESS macro with bootstrapping moves beyond the correlation-based analyses dominating EMI research, providing robust evidence of indirect effects and revealing that teaching effectiveness showed virtually no bivariate correlation with deep learning (r=.05, p=.486) yet demonstrated a significant indirect pathway through buoyancy. Practically, the findings demonstrate that both relational and pedagogical dimensions of instruction are modifiable factors practitioners can target to enhance student resilience and deep learning outcomes.

These contributions collectively reframe how we conceptualize effective EMI education. Rather than focusing narrowly on students' language deficits or attempting to simplify content, the findings shift attention to strength-based approaches that cultivate psychological resilience. Effective EMI education requires institutions and instructors to prioritize developing students' psychological resources (their capacity to persist through challenges, maintain engagement despite frustration, and sustain cognitive effort) alongside traditional linguistic accommodation. By fostering academic buoyancy through high-quality teaching and supportive relationships, EMI programs can empower students to truly thrive in multilingual learning environments.

ETHICS

The author obtained an informed consent from all participants. Ethical approval was obtained from the Inha University Institutional Review Board (Approval No. 250213-1A).

DECLARATION OF COMPETING INTEREST

None declared.

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