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Modeling cognitive and psychological development in mock conferences: exploring the roles of simulation, intervention, competence, and motivation

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Abstract

Mock conferences, classroom simulations in which student interpreters take the roles of speakers, interpreters, and audiences, are widely used in interpreter training, yet the mechanisms linking design features and learner characteristics to cognitive and psychological outcomes remain unclear. This study proposes and tests an integrative model linking classroom simulation, teacher intervention, linguistic proficiency, interpreting motivation, anxiety, enjoyment, and cognitive competence. A mixed-methods design combined partial least squares structural equation modelling (PLS-SEM) analysis of 115 student interpreters' survey responses with thematic analysis of 56 reflective journals. Linguistic proficiency showed the strongest positive associations with analytical and metacognitive competence, lower anxiety, and higher enjoyment, and was indirectly linked to metacognitive competence through anxiety reduction. Classroom simulation and motivation were positively associated with metacognitive competence and enjoyment but also with heightened anxiety, a double-edged effect corroborated by student reports of somatic tension and cognitive interference. Teacher intervention was associated with reduced anxiety but not with metacognitive competence. Anxiety was negatively associated with metacognitive competence, while qualitative evidence indicated a nonlinear pattern in which moderate pressure sharpened concentration but extreme anxiety impaired comprehension. The study offers a framework for balancing authenticity, motivation, and emotional support in interpreter training.

1. Introduction

Interpreting is a highly situated and context-dependent activity that requires understanding language use in authentic settings [1–5]. Within situated learning paradigms, interpreting instruction is therefore approached as an inherently situated practice [6–8]. Mock conferences are widely regarded as the most elaborated of these practices, bridging classroom instruction and real-world interpreting [9–11]. Research on mock conferences has proceeded along two largely independent tracks: pedagogical design and management [8, 11] and teaching effectiveness [12–16]. Because the two lines have rarely been integrated, how design features and learner characteristics jointly shape student development remains unclear, and findings remain inconsistent about whether high-fidelity simulation and strong motivation alleviate or exacerbate anxiety. This study addresses this gap by examining how mock conference design and learner characteristics relate to student interpreters' self-reported cognitive and psychological development, drawing on both quantitative and qualitative evidence.

1.1. Situated Learning in Interpreter Training

Situated learning, conceptualized by Brown et al. [17] and extended through Lave and Wenger's [18] notion of legitimate peripheral participation, holds that knowledge acquisition is context-dependent and that instruction should engage learners in authentic, task-based activities mirroring professional practice. The paradigm has shifted interpreter education from transmissionist teaching toward experiential, student-centered environments [12, 19]. Its central construct, the community of practice, describes how learners move from the periphery toward expertise under experienced practitioners' guidance, supported by scaffolding that decreases as autonomy grows within the Zone of Proximal Development [18]. González-Davies and Enríquez-Raído [7] stress that situated learning requires more than exposure to professional tasks; it demands authentic

materials, collaboration, and reflective practice—the pedagogical methods that Collins et al. [20] labelled modelling, coaching, scaffolding, articulation, reflection, and exploration.

Situated learning in interpreter training operates in two modes. The first immerses students in professional contexts through internships or mentorship programs [6, 21–23], including medical [24] and legal settings [25]. The second uses high-fidelity classroom simulations—group projects, impromptu speeches, role-plays, and mock conferences—to replicate professional scenarios [8, 26–29]. Mock conferences are central among these, offering structured environments for consecutive or simultaneous interpreting under authentic speaker dynamics, time pressure, and audience feedback [8, 28].

The effects of such simulations, however, are contested. Van De Walle et al. [30] compared peer role-plays with simulated-patient encounters in medical interpreter training and found that the more authentic encounters increased linguistic complexity but also heightened stress, which students nonetheless regarded as facilitative. Atkins et al. [31] cautioned that simulated interactions remain contrived and may alter behavior away from genuine practice, raising questions about skill transferability. The tension between these accounts suggests that the cognitive and affective consequences of simulation hinge less on fidelity as such than on how learners appraise task demands relative to their perceived capacity.

1.2. Mock Conferences in Interpreter Training

Research on the design and management of mock conferences identifies the classroom factors that align with student needs and real-world conference dynamics. Mock conferences can elevate stress [9] and motivation [32] simultaneously, and teacher involvement is critical for orchestrating productive learning environments [27, 33]. Building on these considerations, Li [8] proposed a design framework grounded in situated learning and foregrounding authenticity, scaffolding, reflection, and collaboration, while Pérez Pérez [34] found that material availability shaped students' perceived preparation efficacy and on-task performance. Students thus appear to value authentic pressure and professional immersion, although authenticity-enhancing features may impose cognitive and affective demands requiring careful scaffolding, especially for novices.

Research on effectiveness focuses on how immersive simulations enhance motivation, cognitive competence, psychological resilience, and multitasking. Reported gains include greater enthusiasm and autonomy [14], improved memorization [13], and better anxiety management and coordination [15]; Mirzoyeva et al. [35] documented perceived gains in bilingual, strategic, and professional competences alongside persistent challenges of anxiety and concentration. Such studies seldom integrate multiple data sources, however, which limits triangulation and leaves the interplay among design factors, learner characteristics, and psychological states largely unexamined.

Three issues therefore remain unresolved. First, the relationship between simulation fidelity and learning efficacy is unclear, because authentic environments appear to generate engagement and stress simultaneously. Second, the mechanisms by which design features such as role assignment, task complexity, and teacher scaffolding shape cognitive and psychological outcomes are underexplored. Third, design features and learner characteristics are usually examined in isolation, so their joint contribution to student development is unknown. Addressing these issues requires modelling design features and learner

characteristics together and combining quantitative with qualitative evidence, which is the approach adopted here.

1.3. Cognitive and Psychological Competence in Interpreter Training

Cognitive competence in interpreter training comprises metacognitive and analytical abilities. Metacognitive knowledge refers to learners' understanding and regulation of their own cognitive processes, which becomes metacognitive competence when strategically applied to task goals [36]; analytical abilities involve analyzing and synthesizing complex linguistic input during comprehension and production [37]. Cognitive apprenticeship approaches, which sit comfortably within situated learning, have been widely adopted to develop these competences through simulated or authentic practice [17, 36].

Metacognition is considered central to expertise development [36, 38], and metacognitive awareness and self-regulation are critical for interpreting performance: higher-proficiency learners employ more sophisticated metacognitive strategies [39], metacognitive instruction enhances listening comprehension and self-monitoring [40], and self-regulated learning correlates positively with translation and interpreting competence [41]. Cognitive competence in interpreting also draws differentially on domain-general executive functions, as training inhibition produced immediate and durable improvements in student interpreters' consecutive interpreting performance, whereas updating and task switching did not yield comparable sustained effects [42]. Although mock conferences appear to foster metacognitive and analytical skills, the design elements that facilitate this development remain unclear, as most studies treat design features and learner characteristics as separate predictors rather than modelling them jointly [43].

Psychological competence, encompassing anxiety management and the cultivation of enjoyment, forms a second dimension. Interpreting classroom anxiety correlates negatively with self-efficacy and self-rated competence, whereas social enjoyment predicts self-rated competence positively [44]. The relationship between anxiety and performance is not uniformly negative: student interpreters in simulated encounters described heightened stress as beneficial because it sharpened focus and improved performance [30]. Anxiety and enjoyment also appear to function as independent emotional dimensions rather than opposite poles of a single continuum [44]. Intervention research has concentrated on reducing anxiety through technology-based practice [45] and suggestopedia [46], or on self-regulatory strategies such as anxiety reduction techniques, positive self-talk, and emotional monitoring [47]. Few studies, however, have identified which mock conference design features optimize anxiety management and enjoyment, or modelled anxiety, enjoyment, motivation, and cognitive processes together [44, 45].

1.4. Theoretical Framework and Research Model

This study integrates situated learning theory [17, 18] with Pekrun's [48] control-value theory of achievement emotions. Situated learning explains why classroom simulation and teacher intervention function as scaffolding that bridges decontextualized exercises and professional practice, but it does not explain how design features translate into differential cognitive and affective outcomes. Control-value theory addresses this by positing that achievement emotions depend on two appraisals—perceived control over performance and perceived value of the activity—such that high control and high value generate positive emotions such as enjoyment, whereas low control or low value produce anxiety [48, 49].

The two frameworks together yield a three-layer model. The first layer comprises antecedents: two design features (classroom simulation and teacher intervention) and two learner characteristics (linguistic proficiency and interpreting motivation). The second comprises psychological states (anxiety and enjoyment), which are expected to mediate the relationship between antecedents and outcomes. The third comprises cognitive competences (analytical and metacognitive competence). The model accordingly examines the direct and indirect associations among students' self-perceived linguistic proficiency, interpreting motivation, classroom simulation, teacher intervention, anxiety, enjoyment, and analytical and metacognitive competence in mock conferences (Fig. 1).

1.5. Research Questions and Hypotheses

Two research questions guide the study.

RQ1: Which design features and learner characteristics are associated with student interpreters' cognitive and psychological development during mock conferences, and how do they compare in their contribution?

RQ2: Through what pattern of direct and indirect associations, including affective pathways, do these factors relate to students' cognitive competences, anxiety, and enjoyment?

Situated learning positions high-fidelity simulation as the primary pedagogical mechanism for authentic skill development, while control-value theory implies that its cognitive and affective effects depend on learners' appraisals of control and value. Authentic, high-fidelity simulations with adequate support have been found to enhance reflective thinking, stress management, responsibility, and productivity [8, 28, 50], yet the mixed evidence reviewed above cautions that poorly calibrated fidelity may raise stress without corresponding benefit. Teacher intervention, comprising guidance, feedback, and encouragement, functions as a scaffold that raises perceived control and reduces uncertainty, facilitating reflection and self-regulation [27, 33, 51] and reducing interpreting anxiety [46]. We therefore hypothesize:

H1. Classroom simulation is negatively associated with anxiety.

H2. Classroom simulation is positively associated with enjoyment.

H3. Classroom simulation is positively associated with metacognitive competence.

H4. Teacher intervention is negatively associated with anxiety.

H5. Teacher intervention is positively associated with metacognitive competence.

Beyond pedagogical design, learners' characteristics shape cognitive processing and affective responses. Control-value theory suggests that students with stronger language skills appraise interpreting tasks as more manageable, experience less anxiety, and engage more effectively in metacognitive monitoring. Consistently, higher linguistic proficiency is associated with metacognitive monitoring [39], enjoyment [52], reduced anxiety [53, 54], and more efficient processing [55, 56]. We therefore hypothesize:

H6. Linguistic proficiency is positively associated with analytical cognitive competence.

H7. Linguistic proficiency is negatively associated with anxiety.

H8. Linguistic proficiency is positively associated with enjoyment.

H9. Linguistic proficiency is positively associated with metacognitive competence.

Interpreting motivation, the intrinsic drive and commitment to mastering interpreting, shapes perceived value and the deployment of cognitive strategies. When students value interpreting tasks, they engage more deeply and persist despite difficulty [57, 58]; simulation-based environments have been found to strengthen the internalization of motivation [59], and motivation is associated with lower anxiety, greater enjoyment [44], and stronger self-regulation [60]. We therefore hypothesize:

H10. Interpreting motivation is positively associated with analytical cognitive competence.

H11. Interpreting motivation is negatively associated with anxiety.

H12. Interpreting motivation is positively associated with enjoyment.

H13. Interpreting motivation is positively associated with metacognitive competence.

Finally, control-value theory holds that affective states directly influence cognitive processing. Anxiety, in the forms of apprehension, worry, and nervousness, consumes the working memory resources required for analytical reasoning and metacognitive monitoring [54, 61] and has been linked to weaker performance and less effective metacognitive strategy use [44, 62, 63]. Enjoyment, conversely, is expected to accompany authentic simulation, stronger proficiency, and higher motivation, as specified in H2, H8, and H12. We therefore hypothesize:

H14. Anxiety is negatively associated with analytical cognitive competence.

H15. Anxiety is negatively associated with metacognitive competence. Figure 1 presents the full conceptual model integrating all hypothesized paths.

2. Methods

To address the research questions, we conducted three mock conferences in a consecutive interpreting course. After the third mock conference, we surveyed all participating student interpreters, and collected reflective journals from those who volunteered. Fifty-six students submitted reflective journals, which helped interpret relationships among factors associated with students' cognitive and psychological development.

2.1. Participants

A total of 122 students enrolled in the consecutive interpreting course at a national key university participated in the study. These English majors held Test for English Majors Band 4 (TEM 4) certificates and took part in three curriculum-based mock conferences. Of the 122 initial questionnaire respondents, seven participants were excluded during data screening for providing identical responses across all items, indicating no response variation. The final analytical sample therefore comprised 115 participants with no item-level missing data

requiring imputation. The sample included 17 males and 98 females, with a mean age of approximately 21 years. The age distribution was 18 participants aged 20, 87 aged 21, and 10 aged 22.

These students voluntarily participated in the survey through a campus initiative that offered research participation credits. Participation was not incentivized by financial compensation, ensuring that the primary motivation for participation was educational and developmental. Following the third mock conference session, 122 participants completed a questionnaire survey designed to gather data on their experiences and perceptions. To further explore the factors influencing their cognitive and psychological development, we collected reflective journals from 56 volunteering student interpreters. These journals provided triangulation of the observed effects. Table 1 illustrates the demographic characteristics of participants.

Table 1
Demographic Characteristics of the Participants.

Gender	**N**	**%**
Male	17	14.8
Female	98	85.2
Total	115	100
Age		
20	18	15.6
21	87	75.7
22	10	8.7
Total	115	100

2.2. Settings

The Consecutive Interpreting course included three mock conferences scheduled at the semester's end, which aligns with De Laet's [64] recommendation for integrating mock conferences into interpreter training. These conferences were held on December 4, 11, and 18, 2023, and covered themes of "Cultural and Educational Exchanges," "Environmental Protection and Scientific Development," and "Diplomacy Among Major Powers," respectively. The course consisted of 16 sessions, each lasting 90 minutes. Sessions 1–8 focused on interpreting techniques and practice, while sessions 9–13 involved specialized interpreting training in education, culture, environmental protection, finance, and technology. Session 14–16 involved mock conferences conducted in the simultaneous interpreting laboratory with the presence of microphones, audio recorders, and cameras, enhancing the simulation experience.

2.3. Instruments

Two instruments (survey questionnaires and reflective journals) were employed to address the research questions concerning mock conference design and effectiveness. Each instrument assessed constructs

crucial to understanding the factors influencing student interpreters' cognitive and psychological development.

Instrument 1: Survey Questionnaires

The survey questionnaires were structured to assess several key constructs identified in the study. Items were adapted from existing literature and tailored to interpreter training and mock conference contexts. It should be noted that all constructs were assessed through participants' self-reports. The constructs included:

Classroom simulation (CS): Items from Magen-Nagar and Steinberger [65] assessed the authenticity and relevance of the simulated conference environment.

Teacher intervention (TI): Questions adapted from Turanli and Yildirim [66] examined the teacher guidance and support during the mock conferences.

Interpreting motivation (IM): Items from Glynn et al. [58] and Yang and Wang [67] measured participants' intrinsic motivation towards interpreting tasks.

Linguistic proficiency (LP): Constructed from Schaeffer et al. [68] and Tian et al. [69], items evaluated participants' Chinese and English proficiency relevant to interpreting.

Analytical cognitive competence (ACC) and Metacognitive Competence (MC): Items sourced from Cheung [70], Xu and Mu [71], and Hu et al. [41] assessed analytical and metacognitive abilities during interpreting tasks.

Anxiety (AT) and Enjoyment (EM): Items from Kurz [72], Zhu and Ruan [46], and Xu and Liu [44] explored anxiety and enjoyment during interpreter training. Table 2 outlines the sources and items for each construct.

Table 2
Survey Questions.

Construct	Description of items	References
Classroom simulation	CS1: Participants in the simulation were assigned roles and tasks mirroring real-world scenarios. CS2: The simulation conference was conducted in a true-to-life conference room setting. CS3: The topics and materials addressed during the simulation were aligned with real-life issues.	Magen-Nagar and Steinberger [65]
Teacher intervention	TI1: The teacher effectively presented the content and organized the simulated activities. TI2: The teacher provided encouragement and support to motivate the student interpreters. TI3: The teacher effectively controlled student behavior to ensure good, simulated conference order.	Turanli and Yildirim [66]
Interpreting motivation	IM1: Interpreting ability is very important, and I want to show my abilities in interpreting to others. IM2: I hope my interpreting ability can be higher than most students in my class. IM3: I prefer interpreting assignments that allow me to acquire new knowledge. IM4: The most fulfilling aspect for me is to be able to execute the interpreting task accurately and smoothly.	Glynn et al. [58] Yang and Wang [67]
Linguistic proficiency	LP1: My proficiency in Chinese is solid. LP2: My proficiency in English is solid. LP3: I excel in interpreting skills between Chinese and English. LP4: I am well-versed in foundational knowledge about interpreting, including its categories and the cross-cultural nature.	Schaeffer et al. [68] Tian et al. [69]
Analytical cognitive competence	ACC1: I can analyze the logic and information structure of the speakers during the comprehension stage. ACC2: I can use my short-term memory to deal with the source material while listening. ACC3: I can effectively read and recall my notes during the production stage. ACC4: I can reconstruct the information in a coherent manner during the production stage.	Cheung [70] Xu and Mu [71]
Metacognitive competence	MC1: I consider the speaker's intended message during the interpreting stage. MC2: I consider the listeners' expectations during the interpreting stage.	Hu et al. [41]

Construct	Description of items	References
	MC3: I flexibly employ strategies to enhance accuracy and fluency during the interpreting stage.	
Anxiety Enjoyment	AT1: I generally do not feel nervous about doing interpreting tasks in class. AT2: I do not worry a lot when I make mistakes during interpreting. AT3: I am not anxious when my classmates are better in interpreting. EM1: The interpreting teacher is encouraging, friendly, and supportive. EM2: I enjoy the interpreting class and have learned interesting things. EM3: There is a positive atmosphere in my interpreting class.	Kurz [72] Zhu and Ruan [46] Xu and Liu [44]

Instrument 2: Reflective Journals

After analyzing questionnaire data, we developed a model identifying eight constructs organized into three layers (antecedents, psychological states, and cognitive competences). To complement SmartPLS results, reflective journals were subsequently analyzed to explain and contextualize these quantitative patterns. Students reflected on each specific factor and described its influence on their behavior and decisions.

A total of 56 students volunteered to contribute their reflections through the provided journals and their entries were systematically gathered and synthesized. The model's relevance was evaluated by comparing journal insights with quantitative results.

2.4. Ethical Considerations

The study was approved by the School of Foreign Languages Institutional Review Board in Central South University (Approval No. CSU-SFL-IRB-2023-004). The study was conducted in accordance with the principles of the Declaration of Helsinki. Participant recruitment took place from November 20, 2023 to December 1 2023. All participants were adult university students enrolled in the consecutive interpreting course. Before data collection, all participants were informed about the purpose and procedures of the study, and written informed consent was obtained from all participants. Participants were informed that their participation was voluntary and that they could withdraw from the study without penalty. All data were anonymized prior to analysis.

2.5. Data Collection

Each of the three mock conferences was designed to replicate real-world interpreting scenarios as closely as possible. Students assumed roles as speakers, interpreters, and audience members. To increase the authenticity, eight international students and Master of Translation and Interpreting (MTI) candidates were invited as audience members across all three conferences.

Before each session, students received briefings on topics, roles, and objectives and prepared using course materials and independent research. All three mock conferences took place in a professional simultaneous interpreting laboratory, where students performed assigned roles as speakers, interpreters, and audience members, creating a realistic and immersive environment.

During each conference, students performed consecutive interpreting tasks, transferring the speaker's speech after every few sentences. The course instructor guided sessions and provided feedback on accuracy, fluency, delivery, and note-taking. Immediate debriefings and written feedback helped students identify strengths and areas for improvement. Peer feedback was also encouraged to cultivate a collaborative learning environment.

Following the third mock conference on December 18th, 2023, all 122 students were asked to complete a questionnaire. The questionnaires were administered immediately after the session, and required approximately 20 minutes to complete. Two weeks later, reflective journal prompts were distributed after questionnaire data analysis with SPSS 27.0 and SmartPLS 4.1.0.0. Participation in the reflective journal exercise was voluntary, with each student spending about 15 minutes to complete and submit their journal.

2.6. Data Analysis

To address RQ1, descriptive statistics were computed for each construct, and their relative contribution was assessed through the magnitude of the standardized path coefficients. To address RQ2, questionnaire data were analyzed using SPSS and SmartPLS to model relationships among factors associated with student interpreters' cognitive and psychological development in simulated environments. No custom computational code was used in the analyses. Hypothesis testing in the PLS-SEM analysis was based on two-tailed bootstrapping with 5,000 resamples. Statistical significance was evaluated at $\alpha = .05$. To triangulate the findings, the reflective journals were employed as a supplementary method.

For the questionnaire data, a series of analyses were conducted using SPSS. Descriptive statistics provided an overview of the data, while reliability analysis ensured the consistency of the measures. Subsequently, PLS-SEM was conducted using SmartPLS to assess the relationships between the identified factors and self-reported cognitive and psychological competence. Reflective journals were analyzed in NVivo 12 through thematic analysis to complement the quantitative findings. Two independent coders analyzed a random 20% journal subset ($n = 11$) to ensure reliability of thematic analysis. Intercoder reliability was 0.84 for all themes, indicating acceptable consistency. Qualitative findings were compared with quantitative results to clarify factors associated with student interpreters' cognitive and psychological development in simulated conferences.

3. Results

3.1. Results from the Questionnaires

Based on previous research, eight factors associated with student interpreters' cognitive and psychological development (see Section 1) were identified and an initial model with 15 hypotheses was constructed. SmartPLS was employed to test the hypotheses. The reporting logic for the PLS-SEM results fell into two main parts: first, descriptive analysis was conducted to provide a fundamental overview of the data, including means, ranges, and distributions of the potential factors under study (RQ1). The PLS-SEM model was then

applied to examine how these constructs were associated, and to test the strength of the relationships among constructs (RQ2).

3.1.1 Descriptive Analysis of Key Factors (RQ1)

Comprehensive details on the descriptive statistics for each construct are presented in Table 3, including ranges, means, standard deviations (SD), skewness and kurtosis. Following Kline [73] and Hair et al. [74], the skewness and kurtosis values reported in Table 3 indicated acceptable normality across items. Mean scores indicated generally positive perceptions across constructs on the 7-point scale.

Table 3
Descriptive Analysis of Each Construct.

Constructs	Minimum	Maximum	Means	SD	Skewness	Kurtosis
Interpreting motivation (IM)	1.750	7.000	5.524	1.185	-1.607	2.710
Linguistic proficiency (LP)	1.750	6.750	4.517	1.013	-0.554	0.164
Classroom simulation (CS)	1.667	7.000	5.797	0.954	-1.791	4.280
Teacher intervention (TI)	2.667	7.000	6.017	0.869	-1.277	2.158
Analytical cognitive competence (ACC)	1.000	6.750	4.746	0.941	-1.077	2.024
Metacognitive competence (MC)	1.333	7.000	5.038	0.985	-1.198	2.355
Anxiety (AT)	1.000	6.667	3.362	1.398	0.617	-0.568
Enjoyment (EM)	2.000	7.000	5.980	0.968	-1.590	3.276

Notably, anxiety (AT) showed the lowest overall rating and the greatest variation among constructs. Conversely, Teacher intervention received the strongest and most consistent evaluation. Interpreting motivation (IM), classroom simulation (CS), analytical cognitive competence (ACC), metacognitive competence (MC), and enjoyment (EM) exhibited mean values above the midpoint, suggesting generally positive evaluation. Linguistic proficiency (LP), with a mean of 4.517, received a moderate evaluation. Because RQ1 also concerns the relative contribution of these factors, the magnitude of the standardized path coefficients reported in Table 7 provides the basis for comparison.

3.1.2 PLS-SEM Model Assessment of Associations among Constructs (RQ2)

The PLS-SEM analysis followed a two-step procedure: first, assessment of the measurement model to ensure the model's reliability and validity; second, evaluation of the structural model.

To analyze the measurement model, reliability, convergent validity, and discriminant validity were assessed [75]. Factor loadings, Cronbach's alpha, and composite reliability (CR) determined overall reliability. Convergent validity for constructs was evaluated by average variance extracted (AVE). Discriminant validity was verified

using the Heterotrait-monotrait ratio (HTMT), which compares correlations between traits to those within traits [76]. Results are presented in Tables 4 and 5.

Table 4
Reliability and Convergent Validity Results.

Constructs	Items	Outer Loadings	Cronbach's alpha	CR	AVE
Interpreting motivation	IM1	0.859	0.899	0.928	0.763
	IM2	0.815			
	IM3	0.905			
	IM4	0.912			
Linguistic proficiency	LP1	0.800	0.820	0.882	0.653
	LP2	0.864			
	LP3	0.851			
	LP4	0.709			
Classroom simulation	CS1	0.839	0.805	0.884	0.718
	CS2	0.806			
	CS3	0.895			
Teacher intervention	TI1	0.835	0.774	0.868	0.688
	TI2	0.886			
	TI3	0.762			
Analytical cognitive competence	ACC1	0.794	0.800	0.870	0.627
	ACC2	0.810			
	ACC3	0.726			
	ACC4	0.833			
Metacognitive competence	MC1	0.857	0.815	0.889	0.729
	MC2	0.828			
	MC3	0.875			
Anxiety	AT1	0.872	0.796	0.880	0.710
	AT2	0.879			
	AT3	0.774			
Enjoyment	EM1	0.835	0.866	0.918	0.790
	EM2	0.918			
	EM3	0.911			

Table 5
Heterotrait-Monotrait Ratio (HTMT) Results.

ACC	ACC	AT	CS	EM	IM	LP	MC	TI
AT	0.321							
CS	0.328	0.126						
EM	0.545	0.219	0.485					
IM	0.266	0.192	0.368	0.384				
LP	0.808	0.463	0.382	0.436	0.149			
MC	0.807	0.366	0.621	0.631	0.362	0.704		
TI	0.388	0.300	0.541	0.562	0.223	0.499	0.573	

Table 4 reports outer loadings, Cronbach's alpha, CR, and AVE values for each construct and its associated items to ensure the robustness and validity of the PLS-SEM model. All factor loadings exceeded the 0.7 benchmark, indicating satisfactory quality for each item [75]. The Cronbach's alpha values across constructs surpassed the recommended 0.7 threshold [77]. Additionally, CR values were also above the suggested threshold of 0.7 [73], and AVE for each construct exceeded the 0.5 criterion [78].

Table 5 further demonstrates that all HTMT values were below the recommended cutoff of 0.85 [76], affirming acceptable discriminant validity. Based on Tables 4 and 5, the measurement model was therefore deemed reliable and valid, ensuring the accuracy and trustworthiness of the PLS-SEM analysis.

Before proceeding with further analyses, model fit and predictive relevance were examined. The Goodness of Fit (GOF) index, R2 values of endogenous variables, and the Stone-Geisser test (Q2) were incorporated to assess PLS-SEM model fit [79] and examine the predictive performance of the measurement model [80]. Table 6 presents the results.

Table 6
Model Fit of the Proposed Model.

Construct	AVE	R^2	Q^2
Interpreting motivation	0.763		
Linguistic proficiency	0.653		
Classroom simulation	0.718		
Teacher intervention	0.688		
Analytical cognitive competence	0.627	0.458	0.443
Metacognitive competence	0.729	0.532	0.511
Anxiety	0.710	0.233	0.205
Enjoyment	0.790	0.287	0.267
AVE x R^2	0.268		
GOF=√AVE x R^2	0.518		

Table 6 includes values for AVE, R^2, and Q^2 for each construct. GOF values range from 0 to 1, with benchmarks of 0.10, 0.25, and 0.36 representing small, moderate, and large effects [81]. The GOF index, calculated as the square root of the product of AVE and R^2, was 0.518, indicating a good model fit. The R^2 and Q^2 values further suggested satisfactory explanatory and predictive performance.

A common method bias assessment was conducted using Harman's single-factor test with unrotated principal component analysis [82]. The single factor extracted accounted for 28.65% of the total variance, which is substantially below the recommended threshold of 50%, suggesting limited influence of common method bias on the findings.

Following the confirmation of the model's fitness, structural modeling was conducted to examine the hypothesized relationships. Table 7 presents the path coefficients, standard deviations, T-values, P-values, effect size (f^2), and variance inflation factor (VIF) resulting from a bootstrapping procedure with 5,000 resamples [75]. These results illustrate the associations among the eight constructs that shape student interpreters' cognitive and psychological development.

Table 7
Path Coefficients and Hypotheses Testing.

Hypothesized relationship	Path coefficient (β)	Standard deviation	T values	P values	Supported	f^2	VIF
H1: CS -> AT	-0.215	0.103	2.080	0.038	No	0.043	1.381
H2: CS -> EM	0.270	0.136	1.980	0.048	Yes	0.084	1.214
H3: CS -> MC	0.284	0.111	2.558	0.011	Yes	0.120	1.442
H4: TI -> AT	0.213	0.078	2.742	0.006	Yes	0.043	1.386
H5: TI -> MC	0.117	0.079	1.479	0.139	No	0.020	1.445
H6: LP -> ACC	0.619	0.071	8.690	< 0.001	Yes	0.580	1.217
H7: LP -> AT	0.381	0.089	4.227	< 0.001	Yes	0.156	1.213
H8: LP -> EM	0.255	0.106	2.398	0.017	Yes	0.083	1.102
H9: LP -> MC	0.362	0.077	4.709	< 0.001	Yes	0.200	1.402
H10: IM -> ACC	0.159	0.070	2.274	0.023	Yes	0.044	1.070
H11: IM -> AT	-0.176	0.089	1.969	0.049	No	0.036	1.125
H12: IM -> EM	0.227	0.108	2.096	0.036	Yes	0.064	1.121
H13: IM -> MC	0.195	0.081	2.400	0.016	Yes	0.069	1.165
H14: AT -> ACC	0.052	0.089	0.580	0.562	No	0.004	1.225
H15: AT -> MC	0.188	0.074	2.539	0.011	Yes	0.058	1.304
Note: Anxiety (AT) items were reverse-coded, so higher scores indicate lower anxiety							

Several key findings emerged from the data presented in Table 7 and Fig. 2 regarding the strength and significance of the various paths in the proposed model. The following five paths were identified as the strongest:

H6 (LP -> ACC): With a path coefficient of 0.619 and a T-value of 8.690, this path indicated a highly significant positive association between linguistic proficiency and analytical cognitive competence, underscoring the central role of linguistic proficiency in interpreter training.

H7 (LP -> AT): A path coefficient of 0.381 and a T-value of 4.227 indicated a significant positive correlation between linguistic proficiency and anxiety. Given that anxiety items were reverse-coded, this result reflects a

negative association with actual anxiety.

H9 (LP -> MC): A path coefficient of 0.362 and a T-value of 4.709 showed a very significant positive association between linguistic proficiency and metacognitive competence, further highlighting the importance of linguistic proficiency.

H3 (CS -> MC) and H2 (CS -> EM): Classroom simulation was positively associated with both metacognitive competence and enjoyment. The path coefficient of 0.284 (T = 2.558) for classroom simulation to metacognitive competence indicated a robust relationship, while the coefficient of 0.270 (T = 1.980) for classroom simulation to enjoyment suggested realistic training environments may support both cognitive and affective development.

Some paths exhibited weaker, albeit statistically significant, relationships:

H8 (LP -> EM) showed the strongest relationship among this group (β = 0.255, T = 2.398, p = 0.017), indicating a positive association between linguistic proficiency and enjoyment.

H12 (IM -> EM) followed (β = 0.227, T = 2.096, p = 0.036), suggesting that higher interpreting motivation was positively associated with enjoyment.

H4 (TI -> AT) yielded a comparable coefficient (β = 0.213, T = 2.742, p = 0.006), reflecting a weak negative association between teacher intervention and actual anxiety.

H13 (IM -> MC) was supported (β = 0.195, T = 2.400, p = 0.016), indicating a positive association between interpreting motivation and metacognitive competence.

H15 (AT -> MC) also showed a weak negative association between actual anxiety and metacognitive competence (β = 0.188, T = 2.539, p = 0.011).

H10 (IM -> ACC) demonstrated the weakest significant effect (β = 0.159, T = 2.274, p = 0.023), revealing a modest positive association between interpreting motivation and analytical cognitive competence.

Four hypotheses were not supported by the data:

H1 (CS -> AT) and H11 (IM -> AT) were not supported because their path coefficients were in the opposite direction to that hypothesized (β = -0.215, p = 0.038; β = -0.176, p = 0.049, respectively).

H5 (TI -> MC) and H14 (AT -> ACC) were not supported due to non-significant p-values (β = 0.117, p = 0.139; β = 0.052, p = 0.562, respectively).

A mediation analysis tested whether anxiety mediated relationships between the four antecedents (CS, LP, IM, TI) and cognitive outcomes (ACC, MC) using bootstrapping with 5,000 resamples. Only linguistic proficiency showed a significant indirect effect on metacognitive competence through anxiety (Table 8). This suggests that linguistic proficiency may enhance metacognitive competence partly by reducing anxiety. All other indirect effects were non-significant, suggesting that anxiety did not substantially mediate the remaining relationships.

Table 8
Indirect Effects (Mediation) Test Results.

Indirect path	Indirect effect (β)	Standard deviation	T values	P values	95% CI	Significant?
CS -> AT -> ACC	-0.011	0.020	0.540	0.589	[-0.050, 0.028]	No
IM -> AT -> ACC	-0.009	0.020	0.463	0.644	[-0.048, 0.030]	No
LP -> AT -> ACC	0.020	0.034	0.573	0.566	[-0.047, 0.087]	No
TI-> AT -> ACC	0.011	0.021	0.522	0.602	[-0.031, 0.053]	No
CS -> AT -> MC	-0.040	0.029	1.381	0.167	[-0.097, 0.017]	No
IM -> AT -> MC	-0.033	0.021	1.538	0.124	[-0.075, 0.009]	No
LP -> AT -> MC	0.071	0.032	2.245	0.025	[0.008, 0.134]	Yes
TI -> AT -> MC	0.040	0.023	1.711	0.087	[-0.006, 0.086]	No

Note: CI stands for confidence interval

3.2. Results from Reflective Journals (RQ2)

Following the survey, 56 reflective journals containing responses to 12 open-ended questions were analyzed through thematic coding in Nvivo12. The thematic analysis employed a two-stage coding framework to qualitatively examine student reflective journals on simulated conference interpreting training. Stage 1 applied deductive coding, utilizing eight sensitizing constructs derived from the prior quantitative model as the analytical framework. Stage 2 involved inductive coding within these categories, systematically identifying and distilling emergent experiential sub-themes directly from student narratives (e.g., authenticity, cognitive interference, team collaboration, logical structuring).

The coding yielded a multidimensional profile of student perceptions. Classroom simulation was predominantly characterized by its heightened authenticity and performance pressure, which paradoxically served as a dual-force, inducing acute stress while simultaneously sharpening concentration and in-situ adaptability. 35 participants reported greater adaptability, focus, and stress resistance, alongside greater awareness of their strengths and weaknesses in simulated conferences. Teacher intervention was less frequently cited but critically valued for delivering corrective feedback and metacognitive guidance, with its emotional valence acting as a significant amplifier of both failure salience and positive reinforcement. 22 participants linked feedback and encouragement with reduced anxiety. In terms of skill acquisition (analytical and linguistic proficiency), students reported strategic refinements in listening sensitivity to diverse accents, hierarchical note-taking, and coordinated expression-monitoring. 24 participants emphasized that thorough

preparation and stronger interpreting skills helped them perform more effectively and all 56 participants reported perceived improvements of analytical cognitive competence following mock conferences. Notably, anxiety emerged as the most densely coded construct, manifesting primarily as performance-induced cognitive interference and somatic tension; however, repeated exposure demonstrably cultivated regulatory mechanisms and resilience. Anxiety reduction was mentioned by 50 participants and was linked to better anxiety management and higher metacognitive competence. This regulatory trend was directly linked to enhanced interpreting motivation and enjoyment, with the latter deriving from novel engagement and a tangible sense of accomplishment. 28 participants described mock conferences as engaging and confidence-building. Crucially, metacognitive competence functioned as a superordinate theme, transcending isolated skill practice to encompass inferential reasoning, team-based collaboration, leadership roles, and heightened self-observation, enabling students to benchmark their performance against peers and strategically recalibrate their approaches. 36 participants underscored its close connection with the structured training environment. The complete coding framework and illustrative excerpts are provided in Supplementary Table S1.

To complete the mixed-methods integration, a joint display was constructed to systematically juxtapose each quantitative path against its corresponding qualitative evidence. Table 9 maps all fifteen hypothesized relationships (H1-H15). Integrated interpretations are explicitly classified as convergence (qualitative evidence aligns with the statistical finding) and divergence (qualitative evidence contradicts the statistical finding or the hypothesized direction).

Table 9
Integration of Quantitative and Qualitative Findings.

Quantitative Relationship	**PLS-SEM Finding (β, T, p)**	**Qualitative Theme (Exemplar)**	**Integrated Interpretation**
H6: LP -> **ACC**	β = 0.619, T = 8.690, p < 0.001	*"Good listening ability allows me to focus on important points"*	**Convergence**—Strong linguistic skills enable analytical structuring and strategic prioritization.
H7: LP -> **AT** (reverse-coded)	β = 0.381, T = 4.227, p < 0.001	*"Anxiety mainly stems from feeling inadequate…"*	**Convergence**—Higher proficiency reduces self-reported anxiety
H9: LP -> **MC**	β = 0.362, T = 4.709, p < 0.001	*"consciously control the accuracy of grammar"*	**Convergence**—Linguistic control facilitates metacognitive monitoring and self-correction.
H3: CS -> **MC**	β = 0.284, T = 2.558, p = 0.011	*"Further recognized the gaps between myself and others… serves as motivation"*	**Convergence**—Authentic simulation triggers self-awareness and adaptive strategy refinement.
H2: CS -> **EM**	β = 0.270, T = 1.980, p = 0.048	*"Felt the charm of interpreting"*; *"liked this format"*	**Convergence**—Realistic environment generates engagement and positive affective responses.
H8: LP -> **EM**	β = 0.255, T = 2.398, p = 0.017	*"Progress gives me a sense of accomplishment"*;	**Convergence**—Competence fosters enjoyment through mastery experiences.
H12: IM -> **EM**	β = 0.227, T = 2.096, p = 0.036	*"Excitement and sense of accomplishment… make me happy"*	**Convergence**—Motivation amplifies positive affect via preparatory engagement.
H4: TI -> **AT** (reverse-coded)	β = 0.213, T = 2.742, p = 0.006	*"Feedback gives more specific understanding"*	**Convergence**—Teacher intervention reduces confusion and builds emotional reassurance.
H13: IM -> **MC**	β = 0.195, T = 2.400, p = 0.016	*"Motivation drives me to reflect on my performance"*	**Convergence**—Higher motivation promotes reflective and collaborative metacognitive behaviors.
H15: AT -> **MC** (reverse-coded)	β = 0.188, T = 2.539, p = 0.011	*"The pressure sharpens focus"*; yet *"excessive nervousness makes it impossible to calmly understand"*	**Convergence with qualification**—Qualitative data also suggest a non-linear (inverted-U) effect.
H10: IM -> **ACC**	β = 0.159, T = 2.274, p = 0.023	*"Prior to class, practicing note-taking and listening… to improve language quality"*	**Convergence**—Motivation stimulates deliberate preparation that indirectly enhances analytical processing, albeit with the weakest effect.

Quantitative Relationship	PLS-SEM Finding (β, T, p)	Qualitative Theme (Exemplar)	Integrated Interpretation
H1: CS -> **AT** (hypothesized negative)	β = − 0.215, p = 0.038 (opposite direction)	*"From the moment I enter the venue… hands and feet become cold"*;	**Divergence**—The simulation increases actual anxiety, contradicting the hypothesis; however, this aligns with the empirical negative coefficient. The model captured the unintended pressure effect.
H11: IM -> **AT** (hypothesized negative)	β = − 0.176, p = 0.049 (opposite direction)	*"Excessive concern… translating others' segments in a low voice was much more fluent"*	**Divergence**—Higher motivation paradoxically heightens evaluative fear and performance interference, contrary to the proposed anxiety-alleviating role.
H5: TI -> **MC**	β = 0.117, p = 0.139 (non-significant)	*"Through feedback and reflection, I gain a more specific understanding of strengths and areas for improvement"*	**Divergence**—Students explicitly attribute metacognitive gains to teacher intervention, yet the path fails to reach significance.
H14: AT -> **ACC**	β = 0.052, p = 0.562 (non-significant)	*"When the speaker speaks fast, I stop writing and focus on listening… relying on short notes"* (adaptive strategy); *"excessive nervousness hinders calm understanding"*	**Divergence / Qualification**—No linear effect is found, but qualitative data indicate a conditional, strategy-driven relationship where anxiety triggers cognitive offloading, and only extreme levels impair analysis.

The integrated display reveals strong convergence for paths linking linguistic proficiency to cognitive and metacognitive outcomes, as well as for the affective benefits of simulation and motivation. Notable divergences occur where the quantitative model rejects hypothesized anxiety-reduction effects (CS → AT, IM → AT) and where teacher intervention's metacognitive impact is not statistically supported despite strong student testimony.

4. Discussion

Quantitative and qualitative evidence converged in indicating that mock conferences were perceived as immersive experiences associated with improved self-reported cognitive and psychological outcomes. This study addressed two research questions. Regarding RQ1, teacher intervention and classroom simulation received the highest ratings, whereas linguistic proficiency was rated only moderately and anxiety lowest and most variable; in terms of relative contribution, linguistic proficiency showed the largest path coefficients. Regarding RQ2, the PLS-SEM results revealed a differentiated pattern: linguistic proficiency emerged as the strongest and most versatile predictor, while simulation and motivation exhibited double-edged effects, and anxiety played a selective mediating role. The discussion focuses on key associations, unexpected patterns, and learner variability.

Classroom simulation was positively associated with metacognitive competence and enjoyment. The path coefficients for CS to MC and CS to EM were among the strongest in the model, and qualitative accounts

reinforced this picture: 35 participants reported greater adaptability, focus, and stress resistance in high-fidelity simulations, suggesting that realistic environments help students identify their strengths and weaknesses. However, the hypothesis that classroom simulation would be associated with lower anxiety (H1) was not supported; instead, a negative association with the reverse-coded anxiety score emerged, indicating that higher simulation fidelity was associated with higher actual anxiety. Some students similarly described high-fidelity simulations as stressful and demanding. This tension is consistent with earlier research showing that simulation effects depend on learners' perceptions and perceived task demands [9, 32]. Thus, simulation design requires balancing authenticity with psychological safety. High-fidelity environments may enhance learning, but excessive pressure may undermine their affective benefits.

Teacher intervention was associated with lower perceived anxiety among student interpreters. This pattern suggests that constructive feedback may provide emotional support during demanding interpreting tasks. However, teacher support did not appear to directly enhance metacognitive competence (H5), and only five participants perceived a direct link between teacher support and higher metacognitive awareness. Although teacher encouragement appears to foster a supportive atmosphere, its translation into self-regulatory gains may be indirect or require more time. Some students even noted that teacher intervention could be intrusive, heightening their anxiety when they feared repeating previously corrected mistakes, whereas others explicitly credited teacher feedback for metacognitive growth. This tension supports Gregersen's [83] suggestion that the effect of teacher intervention on anxiety and learning may depend on individual differences. Therefore, teacher support should balance guidance with learner autonomy to reduce anxiety without increasing performance pressure.

Linguistic proficiency showed the broadest associations with cognitive and affective outcomes. Students' reflections similarly indicated that stronger language preparation supported confidence and task readiness. The mediation pathway further suggests that linguistic proficiency may support metacognitive regulation partly by reducing anxiety-related cognitive demands, indicating that language resources function beyond communicative competence by alleviating pressure during complex interpreting tasks. Thus, linguistic proficiency may serve as both a performance resource and a psychological buffer in interpreter development.

Interpreting motivation was associated with stronger metacognitive competence and more positive learning experiences. The qualitative data similarly linked high motivation to a greater sense of accomplishment and focus, suggesting that motivated learners may invest more effort in preparation and self-regulation. Unexpectedly, higher motivation was also associated with greater anxiety, suggesting that motivation may carry emotional costs in demanding training contexts. This pattern may reflect highly motivated students' stronger performance expectations and greater sensitivity to failure. Students' reflections similarly indicated that some learners experienced substantial pressure during realistic simulations. Therefore, motivation should not be viewed as uniformly beneficial; in high-pressure settings, it may intensify self-imposed performance demands. Training programs may therefore benefit from combining motivational support with strategies that regulate performance pressure.

Anxiety showed different relationships with cognitive outcomes: it showed a weak negative association with metacognitive competence (H15) but not statistically significant association with analytical cognitive competence (H14). However, qualitative evidence complicated the linear finding. While moderate pressure "sharpened focus," extreme anxiety "made it impossible to calmly understand" the source text. Students

described using anxiety as a cue to switch strategies (e.g., stopping notes to just listen), suggesting a non-linear, inverted-U relationship, where low and high anxiety impair performance, but moderate anxiety may facilitate vigilance that the linear PLS-SEM could not detect. This may reflect anxiety's influence on cognitive control: emotional pressure can disrupt monitoring and regulation, while analytical performance may be sustained through linguistic proficiency and automaticity. This interpretation resonates with Gregor's [84] assertion that anxiety effects depend on interacting learner factors.

Enjoyment was associated with motivation, linguistic proficiency, and simulation experiences. Students generally described mock conferences as engaging and connected positive experiences with perceived progress. However, enjoyment varied across learners, with some students experiencing the same environment as stressful rather than rewarding. This variation is consistent with flow theory [85] which proposes that enjoyment depends on the balance between perceived challenge and competence. Qualitative expansion added a temporal dimension: students reported that repeated exposure progressively reduced anxiety and increased comfort ("the second training was more relaxed"), suggesting a learning trajectory that cross-sectional models cannot capture. Therefore, simulation difficulty should be adjusted to learners' proficiency levels to maintain engagement while avoiding excessive pressure, and longitudinal practice may gradually enhance affective adaptation.

Overall, the findings indicate that cognitive, affective, and contextual factors interact in shaping students' interpreting development. However, these relationships were not uniform across learners, as reflected in unsupported paths and contrasting personal experiences. Individual differences, including prior experience, personality traits, and anxiety proneness, may shape how students respond to simulation and teacher support. This view aligns with Larsen-Freeman's [86] perspective that learning emerges from dynamic interactions among cognitive, affective, and contextual factors.

In summary, this study highlights the intricate network of factors associated with student interpreters' cognitive and psychological development. The integration of qualitative evidence not only confirmed most significant paths but also revealed important divergences (e.g., simulation increasing anxiety, motivation's paradoxical pressure, teacher feedback's perceived but non-significant metacognitive effect, and the non-linearity of anxiety). The cross-sectional design limits causal inference; nevertheless, the identified associations, including the unexpected ones, provide a differentiated basis for refining interpreter training practices and for designing future longitudinal and experimental research.

5. Conclusions and Implications

This study examined the factors associated with student interpreters' cognitive and psychological development during mock conferences. Using a PLS-SEM model complemented by qualitative evidence, it identified a differentiated pattern of associations among classroom simulation, teacher intervention, linguistic proficiency, interpreting motivation, anxiety, enjoyment, and cognitive competences. Rather than producing uniformly positive outcomes, mock conferences created learning experiences in which cognitive and affective benefits coexisted with psychological costs, and students varied substantially in how they responded to the same training conditions.

Several patterns are central to this picture. Linguistic proficiency showed the broadest associations with cognitive and affective outcomes, whereas classroom simulation and interpreting motivation were double-edged: each was associated with favorable cognitive and affective outcomes as well as with greater anxiety. Teacher intervention was associated with lower anxiety, but its hypothesized association with metacognitive competence was not supported (H5), nor was simulation associated with lower anxiety (H1). Anxiety was negatively associated with metacognitive competence, whereas its association with analytical cognitive competence was not supported (H14); qualitative evidence further indicated that the relationship may be non-linear.

These findings carry practical implications for mock conference training. Rather than maximizing authenticity, intervention, or motivation independently, trainers should create learning environments that balance authenticity, psychological safety, learner autonomy, and performance demands. Authentic simulation remains valuable: professional interpreting booths, high-quality audio equipment, simultaneous interpreting software, realistic scenarios such as conference speeches or political debates, and role-play activities can expose students to genuine professional demands. However, because higher fidelity accompanied both greater enjoyment and greater anxiety, simulation intensity and task difficulty should be calibrated to students' proficiency and readiness, and gradual exposure to increasingly demanding scenarios can help students adapt without excessive pressure.

Teacher support is most effective when it combines guidance with learner autonomy. Trainers should provide timely, specific feedback that identifies strengths and areas for improvement, while structured reflection can help learners internalize feedback and develop self-regulation—particularly because teacher intervention was associated with lower anxiety but did not directly enhance metacognitive competence and, for some students, increased performance pressure. Anxiety management should likewise aim to regulate rather than eliminate pressure: supportive conditions and gradually increasing task difficulty can foster adaptation, and trainers should recognize that moderate pressure may sharpen focus for some learners while excessive anxiety may impair comprehension and cognitive regulation.

Strengthening learners' own resources is equally important. Sustained exposure to the target languages, field-specific vocabulary training, and interaction with proficient speakers can improve fluency and comprehension; because linguistic proficiency showed the broadest associations in the model, it should be treated not only as a performance resource but also as a potential buffer against anxiety-related cognitive demands. Cognitive competence may be supported through memory training, note-taking, information prioritization, and activities that develop analytical and critical thinking, combined with opportunities for reflection rather than delivered as isolated skills training. Motivation can be fostered through personal goal setting and progress tracking, alongside varied teaching methods such as interactive workshops, multimedia resources, and gamified activities; because higher motivation also accompanied greater anxiety, motivational support should be paired with strategies for managing performance expectations.

Three limitations qualify these conclusions. First, the cross-sectional design precludes causal inference: although the PLS-SEM model suggests directional associations, reverse causality and third-variable confounds such as working memory capacity, personality traits, and prior interpreting experience cannot be ruled out. Students with stronger metacognitive competence, for instance, may have perceived classroom simulation more favorably rather than gained metacognition from it. Future research should therefore adopt

longitudinal or experimental designs to examine how these relationships develop over time. Second, all key variables relied on self-report measures, which may diverge from actual performance, particularly for the cognitive constructs; behavioral, physiological, or performance-based measures would help validate these findings. Third, the data came from a single university and a relatively modest sample (N = 115) for the complexity of the structural model, although robustness checks supported the stability of the estimates. Replication with larger and more diverse samples is needed to establish generalizability across institutional and cultural contexts.

Taken together, these findings indicate that immersive and supportive learning environments, linguistic resources, motivation, and anxiety jointly shape student interpreters' cognitive and psychological development during mock conferences, and that students respond differently to identical training conditions. Adapting simulation difficulty, teacher support, and motivational strategies to learners' needs is therefore central both to interpreter training design and to students' professional readiness.

Declarations

Data availability

The original data presented in the study are openly available in FigShare at https://doi.org/10.6084/m9.figshare.26180809.

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Author contributions

Conceptualization, X.G. and W.G.; methodology, X.G.; software, X.G.; validation, X.G. and J.H.; formal analysis, X.G.; investigation, X.G. and J.H.; resources, W.G.; data curation, X.G.; writing-original draft preparation, W.G.; writing-review and editing, X.G., J.H. and W.G.; visualization, X.G.; supervision, W.G.; project administration, W.G; Funding acquisition, W.G. All authors have read and agreed to the published version of the manuscript.

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Ethics declarations

Institutional review board statement

The study was conducted in accordance with the Declaration of Helsinki and approved by the Institutional Review Board of the School of Foreign Language, Central South University (protocol code: CSU-SFL-IRB-2023-004 and 15 May 2023).

Informed consent statement

Informed consent was obtained from all subjects involved in the study.

Additional information

Competing interests

The authors declare no conflicts of interest.

Supplementary information

The following supporting information is available: Supplementary Data; Supplementary Data Questionnaire; Supplementary Table S1 (coding framework and illustrative excerpts from reflective journals).

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