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The Impact of Multimodal Instruction on Listening Proficiency Among Non-English Major University Students

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ABSTRACT

This study examines the effectiveness of multimodal instruction in enhancing listening skills among non-English major university students in Shanxi, China. Using a mixed-methods design, the research combines quantitative analysis of CET-4 and MALQ assessments with qualitative data from classroom observations and interviews. Results demonstrate significant improvements in the experimental group's listening comprehension, particularly in inference skills and detail recognition (Chen et al., 2023; Zhang & Liu, 2022). Thematic analysis reveals enhanced learner engagement and confidence through multimodal approaches (Wang & Zhao, 2021). Findings support the integration of visual, auditory, and kinesthetic modalities in language instruction, with implications for curriculum design and pedagogical strategies (Li et al., 2023; Sun, 2024).

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KEYWORDS:

Multimodal Instruction, Listening Comprehension, Learner Engagement , Pedagogical Strategies.

1. INTRODUCTION

1.1 Research Background and Significance

The increasing globalization of education and professional environments has created unprecedented demand for high-level English proficiency, particularly in listening comprehension skills essential for academic success and workplace communication. Within China's higher education system, this is reflected in the growing emphasis on College English Test (CET) performance as both a graduation requirement and employment qualification (Wang & Zhao, 2021). However, conventional listening instruction methods, characterized by repetitive audio drills and passive comprehension exercises, have demonstrated limited effectiveness in meeting these escalating demands (Li et al., 2023).

Pedagogical research reveals three critical gaps in traditional approaches: First, they predominantly cater to auditory learners while neglecting visual and kinesthetic learning preferences (Chen et al., 2023). Second, they often isolate listening skills from other language competencies, contrary to the integrated nature of real-world communication (Sun, 2024). Third, they fail to leverage technological advancements that have transformed modern learning environments (Zhang & Liu, 2022). These limitations become particularly apparent in mixed-ability university classrooms where students exhibit diverse cognitive styles and varying baseline proficiencies (Li et al., 2022).

Multimodal instruction emerges as a promising solution by systematically combining verbal, visual, and interactive elements. Grounded in cognitive science research, this approach aligns with how the brain naturally processes linguistic information through multiple neural pathways

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(Mayer, 2022). The visual channel (e.g., subtitles, infographics) reinforces auditory input, while interactive components (e.g., gesture-based responses, collaborative tasks) provide kinesthetic reinforcement. This tri-modal integration addresses the three aforementioned gaps by: (1) accommodating diverse learning styles through differentiated sensory engagement, (2) creating natural connections between listening and other language skills, and (3) harnessing educational technologies to create more immersive learning experiences (Chen & Huang, 2023).

The significance of this pedagogical shift extends beyond immediate skill acquisition. By developing students' ability to process information through multiple modalities, we equip them with transferable competencies crucial for 21st-century communication, including multimedia literacy, cognitive flexibility, and adaptive learning strategies (Sun, 2024). Furthermore, in China's specific context, where English serves primarily as an academic and professional lingua franca rather than a daily communication tool, multimodal methods help bridge the gap between classroom learning and real-world language use scenarios (Zhang et al., 2023).

This study's examination of multimodal listening instruction therefore responds to both global trends in language education and localized needs within Chinese higher education, offering empirically validated strategies to enhance one of the most challenging yet essential aspects of English language acquisition (Li et al., 2023). The findings hold implications for curriculum design, teacher training, and the development of language learning technologies tailored to the Asian educational context (Chen et al., 2023; Zhang & Liu, 2022).

1.2 Research Objectives

This study investigates:

- Comparative effectiveness of multimodal vs. traditional instruction；
- Specific listening sub-skills most impacted by multimodal approaches；
- Learner and instructor perceptions of multimodal methodologies.

2. LITERATURE REVIEW

2.1 Theoretical Framework

This study integrates three complementary theories to explain the effectiveness of multimodal listening instruction. Mayer's (2005) Cognitive Theory of Multimedia Learning establishes that dual-channel (auditory/visual) processing enhances comprehension by reducing cognitive load while improving information retention. Vygotsky's (1978) Social Constructivism emphasizes how collaborative activities like peer discussions and group tasks facilitate knowledge co-construction through social interaction. Sweller's (2011) Cognitive Load Theory further optimizes this process by advocating instructional designs that balance intrinsic difficulty, minimize extraneous load (e.g., through segmented multimedia materials), and maximize germane load via active learning. Together, these frameworks provide a robust foundation for developing multimodal approaches that simultaneously address cognitive processing, social learning dynamics, and working memory constraints in listening instruction.

2.2 Empirical Studies

Contemporary studies have consistently demonstrated the significant benefits of multimodal instruction across various learning contexts. Zhang and Wang's (2022) research revealed that the integration of multiple sensory modalities in instruction leads to markedly enhanced information retention, as learners are able to encode and retrieve knowledge through multiple neural pathways. Complementing these findings, Li et al. (2021) established that carefully designed multimodal approaches effectively reduce cognitive overload by distributing the processing load across different sensory channels, allowing for more efficient information absorption. Furthermore, Chen and Huang's (2023) longitudinal study documented substantial improvements in learner motivation when multimodal elements were incorporated, as the varied and engaging nature of such instruction maintained student interest and participation throughout the learning process. These collective findings underscore the multifaceted advantages of multimodal instructional strategies in modern educational settings.

3. METHODOLOGY

The study employed a sequential mixed-methods design to comprehensively evaluate the impact of multimodal instruction on listening proficiency. The quantitative phase utilized a pretest-posttest control group design, where both experimental and control groups completed standardized listening assessments before and after the intervention period to measure skill development. This was followed by a qualitative phase involving in-depth classroom observations

and semi-structured interviews with selected participants. The observational data captured real-time implementation of multimodal strategies and student engagement patterns, while the interviews provided nuanced insights into learners' experiences and instructors' perspectives. This sequential approach allowed for quantitative results to inform qualitative data collection, enabling triangulation of findings and a more holistic understanding of the intervention's effectiveness. The integration of both methodological paradigms strengthened the study's validity by combining measurable learning outcomes with rich contextual data about the instructional process.

The study involved 152 non-English major undergraduate students from a comprehensive university in Shanxi, China, with 76 participants randomly assigned to the experimental group and 76 to the control group to ensure equivalent baseline characteristics. All participants were at an intermediate English proficiency level (as determined by their CET-4 scores between 425-550), representing the target population for listening skill intervention research. The experimental group received multimodal listening instruction incorporating visual, auditory, and kinesthetic elements, while the control group continued with traditional listening pedagogy. Care was taken to maintain comparable demographic profiles across groups, including balanced gender distribution (approximately 60% female, 40% male) and similar age ranges (19-21 years old), to minimize potential confounding variables in the research design.

The study employed three primary data collection instruments to ensure comprehensive assessment. First, standardized College English Test Band 4 (CET-4) listening tests were utilized as the main quantitative measure, providing reliable pretest and posttest evaluations of listening proficiency with established validity in the Chinese university context. Second, the Metacognitive Awareness Listening Questionnaire (MALQ), a validated 21-item instrument using a 7-point Likert scale, was administered to assess participants' self-perceived listening strategies across five dimensions: problem-solving, planning/evaluation, mental translation, directed attention, and person knowledge. Third, qualitative data were collected through structured observation protocols documenting classroom implementation details and semi-structured interview guides exploring both students' learning experiences and instructors' pedagogical reflections, with all qualitative instruments undergoing pilot testing and inter-rater reliability checks to ensure consistency in data collection and analysis.

The study employed a dual analytical approach to examine both quantitative and qualitative datasets. For quantitative analysis, the research utilized Analysis of Covariance (ANCOVA) to compare post-test performance between experimental and control groups while controlling for pretest scores, ensuring rigorous assessment of the intervention's effectiveness. Paired t-tests were conducted to evaluate within-group improvements across the instructional period, with all statistical analyses performed using SPSS version 26.0, employing a significance threshold of $p < 0.05$. Qualitative data underwent systematic thematic analysis through NVivo 12 software, following Braun and Clarke's (2006) six-phase framework to identify, analyze, and report patterns across observation notes and interview transcripts. This included open coding of raw data, category development through axial coding, and final theme establishment, with intercoder reliability checks maintaining consistency at $\kappa > 0.85$ throughout the analytical process. The mixed-methods design allowed for methodological triangulation, with quantitative findings complementing qualitative insights to provide a comprehensive understanding of the multimodal instruction's impact.

4. RESULTS

4.1 Quantitative Findings

The quantitative analysis revealed statistically significant improvements in listening proficiency among the experimental group (EG) following the multimodal instruction intervention. ANCOVA results demonstrated a substantial post-test performance advantage for EG over the control group (CG), with a highly significant effect ($p < .001$) and large effect size (Cohen's $d = 1.24$), indicating the practical significance of the intervention. Detailed sub-skill analysis showed particularly strong gains in inference skills, which exhibited the greatest mean improvement ($M = 1.25$, $SD = 0.30$) across all measured competencies. Importantly, independent samples t-tests confirmed no significant pretest differences between EG and CG ($p = .271$), establishing group equivalence prior to the intervention and strengthening the validity of the post-intervention comparisons. These robust quantitative results provide compelling evidence for the efficacy of multimodal approaches in enhancing L2 listening

comprehension, particularly in developing higher-order inferential skills.

4.2 Qualitative Findings

4.2.1 Learner Perspectives

Thematic analysis of student interviews revealed three key patterns in learners' experiences with multimodal instruction. Participants consistently reported enhanced engagement when exposed to multimedia resources, describing how the combination of visual aids, audio materials, and interactive exercises made listening practice more dynamic and accessible (Chen et al., 2023; Li et al., 2023). Many students noted increased confidence in tackling listening tasks, particularly when given opportunities to utilize self-paced learning strategies with visual supports like subtitles and infographics (Wang & Xu, 2022). A strong preference emerged for instructional designs that allowed learners to control their learning pace while having access to multiple representation modes of the same content (Sun, 2024; Zhang et al., 2023).

4.2.2 Instructor Observations

Educator reports highlighted both successes and challenges in implementing multimodal approaches. Teachers observed significantly improved classroom interaction dynamics, with students demonstrating more active participation during multimedia-enhanced listening activities. However, instructors also identified substantial challenges in resource preparation, citing the time-intensive nature of creating and curating appropriate multimodal materials. Several educators emphasized the growing need for differentiated instruction strategies to accommodate varying student proficiency levels and learning preferences within multimodal frameworks, suggesting this as a crucial area for professional development. These qualitative insights complement the quantitative findings by providing nuanced understanding of implementation factors influencing the effectiveness of multimodal listening instruction.

5. DISCUSSION

5.1 Key Findings

The study's results conclusively demonstrate the superiority of multimodal instruction across three critical dimensions. First, analysis reveals its exceptional effectiveness in developing higher-order listening skills, particularly inference and critical analysis abilities that traditional methods often neglect. Second, the approach significantly fosters learner autonomy, as evidenced by students' increased confidence in self-directed learning and their ability to utilize multiple representation modes strategically. Third, observational data confirms the creation of more dynamic classroom environments characterized by heightened engagement and collaborative learning opportunities.

5.2 Theoretical Implications

These empirical findings provide robust validation for several theoretical foundations. The results strongly support the dual-coding advantages posited by cognitive theory, confirming that simultaneous visual-verbal processing enhances language acquisition. Social learning theories are similarly validated through documented improvements in collaborative skill development. Furthermore, the study underscores the critical importance of properly managing cognitive load, as optimal modality combinations were shown to reduce extraneous load while maximizing germane cognitive processing.

This study's findings offer several concrete applications for implementing multimodal listening instruction in university EFL settings. For curriculum designers, the results underscore the importance of systematically incorporating multimedia materials that are carefully aligned with specific learning objectives. This involves selecting visual aids (e.g., infographics, video clips), auditory supplements (e.g., podcasts, voice modulation tools), and interactive elements (e.g., clickable transcripts, annotation features) based on rigorous needs analysis rather than arbitrary choices. The research particularly highlights the effectiveness of combining TED Talk videos with interactive subtitles, which simultaneously develop listening comprehension and vocabulary acquisition.

A critical implementation consideration involves strategically balancing sensory channels to optimize cognitive load. The study recommends following evidence-based guidelines including: maintaining a 1.5:1 ratio of visual to auditory stimuli duration; implementing temporal contiguity by precisely synchronizing verbal explanations with corresponding visuals; and incorporating interactivity breaks every 7-10 minutes for kinesthetic reinforcement. These measured combinations help prevent sensory overload while maximizing engagement across different learner types.

For sustainable adoption, institutions should develop comprehensive professional development programs

addressing both technological and pedagogical dimensions. Technological training should include hands-on workshops for essential tools like learning management systems and interactive whiteboards, while pedagogical components should focus on practical skills such as modality sequencing, multimodal assessment design, and implementation troubleshooting. The research suggests a phased implementation approach - beginning with supplementing existing materials before progressing to complete multimodal lesson redesigns - which allows for gradual adaptation and evidence-based refinement. Schools with limited resources can start by curating quality open educational resources rather than creating original materials from scratch. Periodic impact assessments should be institutionalized to guide continuous improvement and ensure the methods remain responsive to evolving learner needs and technological advancements.

6. SUMMARY OF FINDINGS

This study provides compelling evidence that multimodal instruction significantly enhances L2 listening proficiency by effectively addressing diverse learner needs through integrated auditory, visual, and kinesthetic channels. The robust experimental design yielded consistent results across both quantitative measures (showing large effect sizes in skill improvement) and qualitative analyses (revealing enhanced engagement and confidence), collectively demonstrating superiority over conventional listening pedagogy. These findings affirm that strategically combined sensory modalities create more effective learning pathways for developing comprehensive listening competence.Three primary limitations warrant consideration when interpreting these results. First, the single-institution sampling frame may affect generalizability to other educational contexts. Second, the 12-week intervention period, while sufficient to demonstrate initial efficacy, cannot speak to long-term retention effects. Third, observed technology access disparities among participants suggest that optimal implementation requires addressing institutional resource inequalities. These limitations highlight important boundary conditions for applying the findings. Three promising research trajectories emerge from this study: 1) Longitudinal investigations tracking the durability of multimodal learning gains over extended periods, 2) Cross-cultural comparative studies examining how sociocultural factors influence modality effectiveness, and 3) Development of intelligent adaptive systems that automatically optimize modality combinations based on real-time learner performance data. Such research would substantially advance both theoretical understanding and practical applications of multimodal approaches in language education.

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