Listening Disorders and Listening Comprehension among Learners in Digital English Classrooms: A Mixed-Method Study

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ABSTRACT

The rapid expansion of digital and online learning has transformed English language instruction, making listening comprehension a central component of language input. This study investigates listening disorders and listening comprehension among learners in digital English classrooms by examining the influence of auditory processing ability, digital learning environment quality, teacher instructional strategies, multimedia and assistive tools usage, attention, and concentration level, and learning anxiety with cognitive load. Using a mixed-method, descriptive research design, data were collected from 350 learners through structured questionnaires, listening diagnostic tasks, observations, and interviews. Quantitative analysis revealed that most learners demonstrated generally positive listening comprehension in digital English classes, particularly in understanding spoken English, main ideas, instructions, and important details. However, the findings also showed that high levels of anxiety, mental overload, and attention difficulties significantly hinder effective listening, even among learners with adequate auditory processing ability. Multimedia and assistive tools produced mixed results, indicating that such tools are not automatically beneficial unless properly integrated and guided. The study concludes that while digital English classrooms can effectively support listening development, learner outcomes depend strongly on emotional comfort, cognitive balance, instructional clarity, and technological reliability. The findings offer practical implications for teachers, curriculum designers, and policymakers to create inclusive, low-stress, and learner-friendly digital listening environments.

Keywords: *Listening Comprehension, Listening Disorders, Digital English Classroom, Auditory Processing, Learning Anxiety, Cognitive Load, Online Language Learning.*

1. Introduction

Listening is a core language skill that provides essential input for second-language acquisition. With the rapid shift to digital English classrooms, listening instruction has increasingly relied on online audio, video, and multimedia resources. While digital platforms offer authentic input and flexible learning, they also introduce challenges such as poor audio quality, limited feedback, and increased cognitive load. These challenges particularly affect learners with listening difficulties or auditory processing issues. Despite the importance of listening in online learning, listening disorders and comprehension problems remain underexplored, creating a need to examine their nature, causes, and impact in digital English classrooms.

1.1 Concept of Digital English Classroom

A digital English classroom is a technology-mediated learning environment where English instruction occurs through online platforms, multimedia resources, and digital tools. It supports synchronous and asynchronous learning, provides access to authentic language input, and promotes learner autonomy.

Features such as multimodal content, interactive tasks, and digital assessment enhance engagement and flexibility. However, challenges like the digital divide, technical issues, reduced attention, and limited teacher–learner interaction require thoughtful instructional design and digital competence from both teachers and learners.

1.2 Understanding Listening as a Language Skill

Listening is an active and complex language skill involving cognitive processing, attention, and interpretation of spoken language. It combines bottom-up decoding of sounds and words with top-down use of context and prior knowledge. Listening provides the primary input for language acquisition and supports the development of speaking, reading, and writing skills. Due to features such as fast speech, accents, and reduced forms, listening is often challenging for second-language learners and therefore requires explicit instruction, strategy training, and repeated exposure to authentic input.

1.3 Rationale of the Study

Digital English classrooms rely heavily on listening as the main mode of language input, yet learners with listening difficulties often remain unidentified and unsupported. Technical constraints, cognitive load, and limited teacher feedback intensify these challenges in online settings. This study is necessary to address the lack of systematic understanding of listening disorders in digital English learning and to promote inclusive instructional practices that respond to diverse learner needs.

2. Background Study

Dreossi and Momensohn-Santos (2005) reviewed classroom noise conditions and reported that excessive noise had interfered with learners' attention, speech perception, and comprehension efficiency. They indicated that reduced speech clarity increased listening effort, particularly among vulnerable learners. The study emphasized that effective management of acoustic environments had been essential for improving classroom learning outcomes.

Vandergrift (2007) reviewed developments in second and foreign language listening research and reported that listening comprehension had increasingly been understood as an active, strategic, and metacognitive process. The author highlighted that learners had benefited from planning, monitoring, and evaluation strategies. The review suggested that listening pedagogy had needed to focus on comprehension processes rather than only outcome-based testing.

Bloomfield et al. (2010) examined factors contributing to second-language listening difficulty and reported that problems had arisen due to fast speech rate, unfamiliar vocabulary, reduced forms, accent variation, and limited background knowledge. They also indicated that cognitive constraints and lack of strategy awareness had significantly affected comprehension. The authors recommended explicit strategy training and graded exposure to authentic listening input.

Al Ghafli (2011) investigated the role of mediated glosses and reported that structured gloss support had improved vocabulary retention and comprehension. The findings suggested that guided instructional mediation had enabled learners to process meaning more effectively than unsupported learning. The study emphasized the pedagogical value of instructional scaffolding.

Rost (2014) explained that listening in a multilingual world had posed challenges due to linguistic diversity, contextual variation, and cognitive demands. The author reported that listening comprehension had been influenced by affective factors, social interaction, and real-time processing pressure. The work suggested that instruction had needed to integrate strategy use, confidence-building, and authentic communicative practice.

Barmaki and Hughes (2015) presented a virtual rehearsal environment that had provided real-time feedback for student teachers. They reported that immediate feedback had enhanced teaching performance and reflective practice. The study indicated that technology-supported rehearsal had facilitated skill development when aligned with appropriate training and feedback design.

Gilakjani (2016) explained that listening comprehension had been a central skill in English language teaching because it enabled learners to receive meaningful input and develop other language abilities. The author emphasized that listening had supported vocabulary development, pronunciation awareness, and communication competence, and should have been taught through structured instructional activities rather than treated as passive hearing.

Lemke and Besser (2016) discussed cognitive load and listening effort and reported that listening effort had increased under challenging auditory conditions such as noise or degraded input. They indicated that additional cognitive resources had been required, particularly among older learners. The study emphasized the importance of considering cognitive load in listening assessment and intervention design.

Pichora-Fuller (2016) reported that social and psychological factors had strongly influenced listening behavior. The author indicated that motivation, identity, and social context had shaped how listeners allocated effort and interpreted speech. The study suggested that listening outcomes had depended not only on signal quality but also on situational and interpersonal variables.

Dron (2018) examined smart learning environments from a systems perspective and reported that technological effectiveness had depended on interactions among learners, tools, and institutions. The author argued that technology alone had not guaranteed improved learning outcomes. The study emphasized that poor design could also produce negative educational effects.

Peelle (2018) reviewed listening effort research and reported that degraded auditory input had produced measurable cognitive consequences, including slower processing and reduced memory performance. The author highlighted that listening effort had involved increased neural resource allocation and recommended linking laboratory findings with real-world communication contexts.

Strand et al. (2018) evaluated listening effort measurement tools and reported variation in validity and sensitivity across methods. They indicated that listening effort had been influenced by cognitive abilities and personality-related factors. The study concluded that reliable assessment had required multiple complementary measures.

Patrick (2019) discussed Krashen's comprehensible input theory and reported that language acquisition had occurred when learners understood messages slightly beyond their current proficiency level. The author emphasized that listening had served as a primary channel for such input and supported natural language development through meaningful understanding.

Bozkurt et al. (2020) provided a global analysis of educational disruption during the COVID-19 pandemic and reported serious challenges related to access, equity, and instructional continuity. They indicated that emergency remote teaching had exposed digital divides and institutional unpreparedness. The study emphasized the need for inclusive digital policy and long-term resilience planning.

Francis and Love (2020) examined listening effort and reported that it had reflected both cognitive load and affective responses such as stress, anxiety, and motivation. They suggested that listening difficulty had not been purely cognitive and recommended clearer models to distinguish emotional and cognitive components.

Mwenisongole (2021) examined ICT integration in technical and vocational education in Tanzania and reported that technology had expanded learning opportunities and modernized instruction. However, limited access, funding constraints, and insufficient training had restricted implementation. The author emphasized the need for institutional planning and teacher capacity building.

Alves and Yang (2022) examined cognitive mechanisms underlying entrepreneurship competence and reported that cognitive flexibility and decision-making processes had significantly influenced competence development. The study highlighted that learning outcomes had been closely linked to cognitive engagement and innovation-oriented thinking.

Smalle et al. (2022) reported that implicit statistical learning had improved under cognitive depletion conditions. The findings suggested that reduced controlled attention had sometimes enabled implicit learning systems to function more effectively. The authors emphasized that learning mechanisms had varied depending on cognitive state.

Bialystok and Craik (2022) discussed bilingualism and reported that bilingual experience had modified attentional control mechanisms. They indicated that executive control advantages had depended on task demands and attentional regulation processes.

Yang (2023) examined mobile-blended active learning and reported improvements in students' listening and speaking skills through increased engagement and practice frequency. The study indicated that structured mobile tasks had supported learner autonomy beyond classroom time.

Ozcelik et al. (2023) explored listening comprehension problems during self-regulated peer-interactive tasks and reported that learners had struggled with planning, monitoring, and evaluation processes. The authors emphasized the importance of metacognitive scaffolding and strategy training.

Zaman and Akhter (2023) reviewed AI-integrated adaptive learning systems and reported benefits in personalization and accessibility. However, they noted persistent concerns regarding teacher readiness and overdependence on automation, recommending balanced pedagogical integration.

Hasan et al. (2024) compared EMI learners across academic disciplines and reported that English-medium exposure had influenced confidence and speaking performance differently. The findings indicated that outcomes had depended on departmental context and prior proficiency.

Khan (2024) investigated teachers' perspectives on technology use among Rohingya refugee learners and reported improved access and flexibility but significant infrastructural and training challenges. The study emphasized the need for institutional support.

Soelistiyowati et al. (2024) examined ChatGPT integration in writing instruction and reported increased engagement and efficiency. However, concerns were raised regarding academic integrity and overreliance, suggesting guided and ethical use.

Rafiee and Gilakjani (2024) compared online and offline blended learning and reported that listening outcomes had depended more on instructional structure and engagement than delivery mode alone.

Sun et al. (2024) studied DingTalk-supported problem-based learning and reported improvements in writing performance through collaboration and timely feedback, with motivation and facilitation quality influencing outcomes.

Thuratham and Namsaeng (2025) identified communication challenges among EFL university learners and reported difficulties related to fluency, vocabulary, confidence, and pragmatic competence. The study recommended interactive pedagogy and supportive feedback.

Alqurashi (2025) argued that combining traditional and digital teaching methods had enhanced learner engagement and acquisition when aligned with clear instructional objectives.

Zhang et al. (2025) analyzed technology adoption behavior using social listening and survey data and reported that trust, perception, and social influence had significantly shaped willingness to adopt emerging technologies.

3. Research Methodology

3.1 Research Design

Research design refers to the plan, structure, and strategy adopted to answer the research questions and achieve the objectives of the study. It serves as a blueprint that guides the collection, organization, and interpretation of data in a systematic manner. For the present study titled "Listening Disorders Among Learners in the Digital English Classroom: A Study," a mixed-method approach has been selected to provide a comprehensive understanding of the issue. Considering the nature of the research where both measurable listening challenges and qualitative insights regarding student experiences are important this study integrates descriptive survey research design with qualitative inputs through interviews/observations. The descriptive research design is suitable because the study aims to investigate the prevalence, nature, and contributing factors of listening disorders among learners in digital English learning environments without manipulating the variables. It aims to describe what exists in terms of listening difficulties, learning behaviour, digital exposure, and classroom experiences. The design enables the researcher to collect primary data from a sample population through questionnaires, listening diagnostic tests, and classroom observations. This helps identify symptoms of listening disorders, levels of comprehension difficulty, and patterns in learner responses. The quantitative element allows data to be converted into statistical form, making it possible to compare results across demographic groups.

In addition to quantitative data, qualitative components are incorporated to obtain deeper insights into the subjective experiences of learners and teachers. Listening disorders are not only cognitive but also emotional and behavioural in nature. Some students may experience anxiety, confusion, or reduced confidence during digital listening tasks. Therefore, interviews or open-ended questionnaire items may be used to explore learner perceptions, challenges faced during online listening tasks, and strategies used by teachers to support comprehension. Observational notes may also help capture classroom realities such as distraction levels, technology use, network problems, attention patterns, peer interaction, and teacher support. The combination of quantitative and qualitative data ensures a holistic understanding of the problem. The study follows a non-experimental research design, as no interventions or control groups are created, and the researcher does not manipulate instructional variables. Instead, existing classroom conditions are observed naturally. Learners' listening performance is studied based on their real classroom experiences, which helps maintain ecological validity. This design is most appropriate because the research intends to explore *what* the listening disorders are, *how* frequently they occur, *why* they occur, and *to what extent* the digital classroom contributes to them.

The research will be conducted in selected schools or institutions where English is taught through digital or blended learning modes. The sampling method may include purposive sampling for selecting institutions and students who regularly participate in digital English lessons. A structured questionnaire and listening test will be administered to the sample to gather quantitative data. The researcher will score test responses, categorize error patterns, and measure listening comprehension levels. For qualitative data, semi-structured interviews with teachers and selected students may be conducted to obtain narrative details. Data analysis will involve descriptive statistics such as frequency, percentage, mean scores, and standard deviation to interpret the extent

of listening disorders among learners. Inferential statistics may be used if comparisons across groups are required. The qualitative data will be analyzed using thematic analysis to identify recurring patterns such as technological barriers, attention loss, unfamiliar accents, anxiety factors, and cognitive overload during online listening. This mixed-design research approach ensures reliability and validity by triangulating data from multiple sources. It helps overcome limitations of relying solely on test scores or subjective opinions. The research design for this study is descriptive, non-experimental, and mixed-method in nature. It focuses on identifying and analyzing listening disorders among learners engaged in digital English learning environments without altering the natural teaching process. This design is expected to help derive meaningful conclusions, propose pedagogical solutions, and provide recommendations for improving listening instruction and reducing disorders among learners in digital platforms.

3.2 Population and Sample

The population includes learners studying English in digital/online or blended classrooms (secondary/higher secondary/undergraduate as applicable). A representative sample (about 80–200 learners, as feasible) will be selected from institutions using digital English teaching. A small group of teachers (5–15) may be included for interviews. Inclusion and exclusion criteria will ensure relevant and ethical participation.

3.3 Sampling Techniques

A multi-stage sampling method will be used. Purposive sampling will select institutions where digital English classes are regularly conducted. Then simple random or stratified random sampling will select students to ensure fairness and representation across groups (e.g., gender, grade, urban–rural background, digital exposure). A smaller purposive subset may be chosen for interviews and observations.

3.4 Tools for Data Collection

Data will be collected using multiple tools for accuracy and triangulation:

- **Questionnaire:** Measures self-reported listening difficulties, digital barriers, and listening habits.
- **Listening Diagnostic Test:** Assesses actual listening performance (gist, details, discrimination, inference).
- **Observation Sheet:** Records real-time behaviours like distraction, repetition requests, and strategy use.
- **Interviews (optional):** Explores deeper learner and teacher perceptions, emotions, and classroom challenges.

3.5 Reliability and Validity of Instruments

Reliability will be ensured through pilot testing, clear item design, and Cronbach's Alpha for internal consistency (acceptable ≥ 0.70). Validity will be strengthened through expert review (content validity), clarity checks (face validity), alignment with constructs (construct validity), and correlation with performance indicators (criterion validity). Triangulation across tools will improve overall credibility.

3.6 Procedure of Data Collection

Permission will be obtained from institutions, followed by briefing participants and collecting informed consent. Questionnaires will be administered first, then the listening diagnostic test under controlled conditions. Selected digital sessions will be observed using a checklist. Interviews with selected students and teachers may be conducted for qualitative depth. All data will be compiled, coded, and stored securely for analysis.

3.7 Statistical Techniques for Data Analysis

Quantitative data will be coded and organized in Excel and analyzed using descriptive statistics (frequency, percentage, mean, SD). Where needed, inferential tests may be used to compare groups. Qualitative data from interviews and observations will be analyzed through thematic analysis, identifying key patterns such as audio issues, distraction, anxiety, and cognitive overload.

4. Exploration Of Survey Data and Findings

This section analyzes survey responses from 350 learners to examine Listening Comprehension (LCO) and its influencing factors in digital English classrooms. Data were collected using a structured questionnaire and analyzed through frequency and percentage distribution. Listening comprehension is treated as the dependent variable, while auditory processing ability, digital learning environment quality, teacher instructional strategies, multimedia and assistive tools usage, attention, and concentration level, and learning anxiety with cognitive load serve as independent variables. Overall, findings indicate that learners generally report good listening comprehension, supported by clear instruction, stable digital environments, and effective teacher strategies. However, challenges remain in the areas of attention, sustained concentration, multimedia overload, assistive tool effectiveness, anxiety, and cognitive load. While digital learning enhances listening skills for many learners, emotional stress and mental overload significantly hinder comprehension for a large proportion of students. The results highlight the need for learner-friendly pacing, reduced cognitive load, better alignment of multimedia, and anxiety-sensitive instructional practices in digital English classrooms.

Table 1: Survey Findings (N = 350)

Factor / Dimension	Key Indicators (Combined Items)	Agree + Strongly Agree (%)	Neutral (%)	Disagree + Strongly Disagree (%)	Overall Interpretation
Listening Comprehension (LCO)	Understanding spoken English, main ideas, instructions, details, improvement through digital learning	76–85%	14–27%	<6%	Generally strong listening comprehension
Auditory Processing Ability (APA)	Sound discrimination, speed of processing, understanding without repetition, background noise handling	79–86%	13–19%	<4%	Auditory processing largely adequate
Digital Learning Environment (DLE)	Internet stability, audio clarity, platform usability, device access, technical interruptions, focus support	75–85%	18–21%	<5%	Digital environment mostly supportive
Teacher	Clear task	78–85%	13–19%	<3%	Strong instructional

Instructional Strategies (TIS)	explanation, examples, repetition, effective methods				support
Multimedia & Assistive Tools (MAT)	Captions, visuals, recordings, audio controls, multimedia engagement, assistive tools	19–53%	30–40%	27–50%	Mixed effectiveness; underutilized/misaligned
Attention & Concentration Level (ACL)	Focus, attentiveness, distraction control, sustained attention	24–50%	29–39%	20–37%	Attention is a major challenge
Learning Anxiety & Cognitive Load (LAC)	Anxiety, mental overload, multimodal difficulty, stress due to technical issues	75–82%	14–20%	<6%	High anxiety and cognitive overload

While digital English classrooms effectively support listening comprehension, learners' performance is significantly constrained by attention issues, cognitive overload, and anxiety, indicating the need for simplified multimedia design, reduced pressure, and supportive listening pedagogy.

5. Conclusion and Future Scope

This study examined listening comprehension among 350 learners in digital English classrooms by analyzing the influence of auditory processing ability, digital learning environment quality, teacher instructional strategies, multimedia and assistive tools usage, attention, and concentration level, and learning anxiety with cognitive load. The findings revealed that listening comprehension in digital English classes is generally strong, as most learners reported being able to understand spoken English, follow main ideas, comprehend instructions, identify important details, and experience improvement through digital learning. These results confirm that digital English instruction can effectively support listening development when instructional delivery and learning environments are well managed.

Despite this overall positive trend, the study identified significant challenges that affect listening performance. Learning anxiety and cognitive overload emerged as major barriers, even among learners who otherwise demonstrated good listening ability. Many learners reported feeling anxious, mentally overloaded, and stressed during online listening tasks, particularly when technical issues occurred or when they were unable to understand spoken English immediately. Attention and sustained concentration also showed mixed outcomes, indicating that a substantial proportion of learners struggle to remain focused throughout online listening activities. Additionally, multimedia, and assistive tools such as captions, visuals, audio controls, and transcripts were not perceived as consistently helpful, suggesting that these tools are either underutilized, poorly integrated, or not suitable for all learners. Overall, the findings indicate that the strongest support for listening comprehension in digital English classrooms comes from effective auditory processing ability, clear and supportive teacher instructional strategies, and a stable digital learning environment with good audio quality and minimal technical disruption. In contrast, high levels of anxiety, cognitive load, and attention difficulties reduce the potential benefits of digital listening instruction. Therefore, while digital classrooms offer substantial opportunities for listening development, learner outcomes depend heavily on emotional comfort, cognitive balance, instructional clarity, and technological reliability. Based on these findings, several educational implications emerge. Teachers should continue to provide clear explanations, examples, repetition, and clarification during listening activities, while prioritizing audio clarity and stable connectivity. Instructional pacing should be learner-friendly to reduce anxiety and mental overload, and visual materials should be carefully aligned with audio content to avoid cognitive strain. Attention and engagement can be

enhanced through interactive, short, and well-structured listening tasks. Moreover, learners need guidance and training to use multimedia and assistive tools effectively so that these resources support rather than distract from listening comprehension. The study also highlights important directions for future research. Further studies may apply advanced statistical techniques such as correlation, regression, or structural equation modeling to examine predictive relationships among listening comprehension and its influencing factors. Comparative research across different educational contexts, proficiency levels, and learner backgrounds can provide deeper insights. Qualitative investigations may explore learners' emotional responses, reasons for multimedia overload, and challenges in attention management. Experimental studies testing targeted interventions such as caption training, chunked listening tasks, guided replay, and anxiety-reduction strategies can help identify best practices. In addition, future research may examine the role of technology variables and AI-based listening tools in enhancing digital English listening outcomes. The study establishes that digital English classrooms generally support listening comprehension, but high anxiety, cognitive overload, and inconsistent attention remain critical challenges. Multimedia and assistive tools are beneficial only when they are well designed, thoughtfully integrated, and supported by effective pedagogy. Improving digital listening outcomes therefore requires a balanced approach that combines technical quality, supportive teaching practices, cognitive load management, and emotional assurance for learners.

References

1. Gilakjani, Abbas Pourhosein. "The significance of listening comprehension in English language teaching." *Theory and Practice in language studies* 6.8 (2016): 1670.
2. Hasan, Md Mahadhi, Most Mobina Yesmin, and Md Kamal Hossain. "Effects Of English Medium Instruction (EMI) On Students'academic and Speaking Performance: Comparison Between English Major and Non-English Departments." *Ilha do Desterro* 77 (2024): e100248.
3. Khan, Akibujjaman. *The implementation of technology in teaching English to Rohingya refugees: a perspective of the teachers in Bangladesh*. Diss. Brac University, 2024.
4. Soelistiyowati, Endang, et al. "Enhancing college learners' writing skills through the integration of chatgpt: strategies, benefits, and concerns." *Eralingua Jurnal Pendidikan Bahasa Asing Dan Sastra* 8.1 (2024): 1.
5. Thuratham, Wadinlada, and Pasara Namsaeng. "Challenges in English Communication Skills of University-Level EFL Learners." *FWU Journal of Social Sciences* 19.3 (2025).
6. Yang, Yang. *Mobile-Blended active language learning management to enhance english listening and speaking skills of secondary school students*. Diss. Chiang Mai: Graduate School, Chiang Mai University, 2023.
7. Ozcelik, Hatice Nur, Kris Van den Branden, and Elke Van Steendam. "Listening comprehension problems of FL learners in a peer interactive, self-regulated listening task." *International Journal of Listening* 37.2 (2023): 142-155.
8. Dreossi, Raquel Cecília Fischer, and Teresa Momensohn-Santos. "Noise and its interference over students in a classroom environment: literature review." Pró-Fono Revista de Atualização Científica 17 (2005): 251-258.
9. Rafiee, Forough, and Abbas Pourhosein Gilakjani. "A Comparative Study on the Impact of Online and Offline Blended Teaching on Listening Performance." *Education* 9 (2024): 4.
10. Zaman, Md Arif Uz, and Elmoon Akhter. "Adaptive learning systems for English literature classrooms: A review of AI-integrated education platforms." *International Journal of Scientific Interdisciplinary Research* 4.3 (2023): 56-86.
11. Barmaki, Roghayeh, and Charles E. Hughes. "Providing real-time feedback for student teachers in a virtual rehearsal environment." *Proceedings of the 2015 ACM on international conference on multimodal interaction*. 2015.

12. Mwenisongole, Christine. *Information Communication Technology Through Technical Vocation Education and Training: Experiences from Arusha Tanzania*. Diss. The Open University of Tanzania, 2021.
13. Alqurashi, Naif. "Enhancing Language Acquisition: Integrating Traditional and Digital Methods for Learner Engagement." *ESI Preprints (European Scientific Journal, ESJ)* 21.2 (2025): 41-41.
14. Bozkurt, Aras, et al. "A global outlook to the interruption of education due to COVID-19 pandemic: Navigating in a time of uncertainty and crisis." *Asian journal of distance education* 15.1 (2020): 1-126.
15. Dron, Jon. "Smart learning environments, and not so smart learning environments: a systems view." *Smart learning environments* 5.1 (2018): 25.
16. Sun, Lixuan, et al. "Empowering Chinese undergraduates' business english writing: Unveiling the efficacy of DingTalk-Aided Problem-based language learning during Covid-19 period." *Education and Information Technologies* 29.1 (2024): 239-271.
17. Vandergrift, Larry. "Recent developments in second and foreign language listening comprehension research." *Language teaching* 40.3 (2007): 191-210.
18. Patrick, Robert. "Comprehensible Input and Krashen's theory." *Journal of Classics Teaching* 20.39 (2019): 37-44.
19. Bloomfield, Amber, et al. "What makes listening difficult? Factors affecting second language listening comprehension." (2010).
20. Rost, M. (2014). Listening in a multilingual world: The challenges of second language (L2) listening. *International Journal of Listening*, *28*(3), 131-148.
21. Al Ghafli, Mansour Hussain. "The effect of mediated glosses on vocabulary retention and reading comprehension with English language learners in Saudi Arabia." (2011).
22. Zhang, C., et al. “The Influence Mechanism of the Willingness to Use Autonomous Taxis: A Combined Analysis of Social Listening and Questionnaire Survey.” *Transportation*, vol. 52, no. 6, 2025, pp. 2475–2509.
23. Alves, J., and W. Yang. “Cognitive Mechanisms in Entrepreneurship Competence: Its Implication for Open Innovation.” *Journal of Open Innovation: Technology, Market, and Complexity*, vol. 8, no. 2, 2022, p. 65.
24. Smalle, E. H., et al. “Unlocking Adults’ Implicit Statistical Learning by Cognitive Depletion.” *Proceedings of the National Academy of Sciences*, vol. 119, no. 2, 2022, e2026011119.
25. Bialystok, E., and F. I. Craik. “How Does Bilingualism Modify Cognitive Function? Attention to the Mechanism.” *Psychonomic Bulletin & Review*, vol. 29, no. 4, 2022, pp. 1246–1269.
26. Francis, A. L., and J. Love. “Listening Effort: Are We Measuring Cognition or Affect, or Both?” *Wiley Interdisciplinary Reviews: Cognitive Science*, vol. 11, no. 1, 2020, e1514.
27. Lemke, U., and J. Besser. “Cognitive Load and Listening Effort: Concepts and Age-Related Considerations.” *Ear and Hearing*, vol. 37, 2016, pp. 77S–84S.
28. Peelle, J. E. “Listening Effort: How the Cognitive Consequences of Acoustic Challenge Are Reflected in Brain and Behavior.” *Ear and Hearing*, vol. 39, no. 2, 2018, pp. 204–214.
29. Pichora-Fuller, M. K. “How Social Psychological Factors May Modulate Auditory and Cognitive Functioning during Listening.” *Ear and Hearing*, vol. 37, 2016, pp. 92S–100S.
30. Strand, J. F., et al. “Measuring Listening Effort: Convergent Validity, Sensitivity, and Links with Cognitive and Personality Measures.” *Journal of Speech, Language, and Hearing Research*, vol. 61, no. 6, 2018, pp. 1463–1486.