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THE ROLE OF NEUROPEDAGOGY IN DEVELOPING LISTENING COMPREHENSION COMPETENCE IN ENGLISH LEARNING

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Abstract: Listening comprehension is one of the most complex and cognitively demanding components of English language learning. Unlike reading, listening is transient: learners must perceive acoustic signals, identify phonological patterns, recognize words, construct meaning, retain information in working memory, make predictions, and integrate incoming information with previously acquired knowledge, often within fractions of a second. These characteristics make listening particularly suitable for a neuropedagogical perspective. Neuropedagogy, understood as an interdisciplinary approach connecting neuroscience, cognitive psychology, and pedagogy, provides a framework for considering how attention, working memory, neuroplasticity, emotion, metacognition, and multisensory processing influence language learning. This article examines the role of neuropedagogy in the development of English listening comprehension competence through an integrative review of international research published mainly after 2000.

Keywords: Neuropedagogy, listening comprehension, English language learning, educational neuroscience, cognitive processes.

Introduction

The ability to understand spoken English is increasingly important in contemporary education because English is encountered not only in the classroom but also through international communication, online lectures, podcasts, films, social media, academic materials, and professional environments. Nevertheless, listening comprehension frequently remains one of the least successfully developed language skills among foreign-language learners. Students may possess considerable grammatical and lexical knowledge and still experience difficulty understanding spontaneous speech. The problem becomes especially visible when speakers use natural speed, reduced forms, connected speech, unfamiliar accents, hesitation phenomena, or vocabulary that has not yet become automatically accessible.

The difficulty of listening is partly explained by the nature of the cognitive processes involved. During listening, information disappears immediately after it is produced. A learner cannot normally return to the previous linguistic signal in real communication. Therefore, successful comprehension depends on the rapid coordination of auditory perception, attention, lexical access, working memory, contextual prediction, inferencing, and meaning construction. Research on second-language listening has demonstrated that learners can encounter difficulties at several stages of processing, including perception, parsing, and utilization of linguistic information.

These characteristics suggest that listening instruction should not be viewed simply as a sequence of exercises in which learners listen to a recording and answer comprehension questions. Listening is a dynamic cognitive activity, and effective pedagogy should take into account the mental processes that enable learners to transform an acoustic signal into meaningful language.

This is where neuropedagogy becomes relevant. The term refers broadly to approaches that seek to connect knowledge about brain functioning and learning with educational theory and practice. Contemporary educational neuroscience emphasizes that the relationship between neuroscience and education is interdisciplinary and translational: findings about the

brain cannot simply be transferred directly into classroom techniques, but should be interpreted through cognitive psychology and educational research. The concept is particularly relevant to foreign-language learning because language experience itself is associated with changes in the brain. Research on second-language learning has demonstrated that language experience can be accompanied by functional and structural neuroplastic changes, although these changes vary according to age, proficiency, intensity of learning, individual differences, and other factors.

The present article examines how these insights can inform the development of English listening comprehension competence. The principal objective is not to claim that neuropedagogy constitutes a completely independent teaching methodology. Instead, the article seeks to establish a theoretically grounded connection between neuroscience-informed principles and established approaches to second-language listening instruction.

Methods

The study was designed as an integrative theoretical literature review. The purpose of this methodological approach was to bring together findings from several related research areas rather than to conduct a new experimental investigation. The literature considered in the analysis included research in educational neuroscience, cognitive neuroscience, second-language acquisition, listening pedagogy, metacognition, attention, and neuroplasticity. Particular attention was given to peer-reviewed international publications produced after 2000. The literature was selected according to four main criteria.

First, publications had to address cognitive, neural, or pedagogical mechanisms relevant to language learning or listening comprehension. Second, preference was given to peer-reviewed international journal articles and major scholarly reviews. Third, studies had to provide a theoretical or empirical basis for understanding processes such as attention, metacognition, neuroplasticity, auditory processing, or language comprehension. Fourth, sources were considered for their relevance to practical foreign-language teaching. The review did not attempt to calculate a statistical effect size because the selected literature consisted of theoretically and methodologically heterogeneous studies. Instead, a thematic synthesis was conducted. Findings were organized around six interconnected dimensions: attention, working memory, auditory and linguistic processing, neuroplasticity, emotion and motivation, and metacognition. This approach is appropriate because educational neuroscience is itself an interdisciplinary field. Recent reviews have emphasized that its major challenges concern the translation of basic neuroscience into authentic educational contexts. Consequently, the present article treats neuroscientific findings as a source of theoretical explanation rather than as direct evidence that one specific classroom technique will automatically improve listening performance.

Results

The literature indicates that listening comprehension should be conceptualized as an active process rather than passive reception. A listener does not merely hear sounds; the listener selects relevant information, identifies linguistic units, activates lexical knowledge, constructs propositions, integrates information with context, and continuously revises interpretations. John Field's research on L2 listening demonstrates the importance of understanding which elements of spoken input learners actually identify and process. This has significant pedagogical implications. Learners who have not developed automatic recognition of frequent words and sound patterns may devote excessive cognitive resources to decoding individual items. As a result, fewer resources remain available for understanding the overall message. For example, a learner may know the written form of going to but fail to recognize the reduced spoken form /gənə/ in natural speech. Similarly, students may know

individual vocabulary items but fail to segment a continuous stream of speech into recognizable words. A neuropedagogical approach therefore suggests that listening development should involve gradual movement from controlled perception toward increasingly automatic processing.

Attention is one of the central mechanisms underlying successful listening. Spoken language contains considerably more information than a learner can consciously process at any one moment. The learner must therefore selectively attend to relevant features of the auditory signal. In classroom conditions, attention can be disrupted by unfamiliar vocabulary, excessive task difficulty, background noise, anxiety, monotonous materials, or overly long recordings. When attentional demands exceed learners' available cognitive resources, comprehension may decline. Neuropedagogically informed teaching can address this problem by preparing learners before listening. Pre-listening activities can activate relevant vocabulary, introduce the communicative context, establish a clear purpose, and encourage learners to predict possible content. For example, instead of beginning a lesson with a three-minute recording and a list of ten questions, a teacher might first present a photograph and ask: Who are the people? Where might they be? What are they probably talking about? What words might you hear?

Such activities are pedagogically useful because they provide the learner's attentional system with a conceptual framework. The learner enters the listening activity with expectations rather than encountering the auditory signal without preparation.

Research on educational neuroscience also supports the importance of recognizing attention as a cognitive resource rather than assuming that students can maintain unlimited concentration. Educational applications should therefore be aligned with what is known about attention and cognitive processing rather than based on simplistic claims about “using” particular parts of the brain.

Discussion

4.1. From neuroscience to classroom practice

The findings synthesized in this review suggest that neuropedagogy can contribute to English listening instruction through a set of principles rather than a rigid teaching method. The first principle is attention before complexity. Learners should know what they are listening for. Clear purposes can reduce unnecessary cognitive load. The second principle is gradual processing development. Listening materials should become more complex progressively, allowing learners to develop automaticity while still challenging their cognitive systems. The third principle is meaningful repetition. Repeated exposure should involve different cognitive objectives rather than simple mechanical repetition. The fourth principle is metacognitive regulation. Students should learn to monitor, evaluate, and adjust their listening strategies. The fifth principle is emotional and social engagement. Listening tasks should contain meaningful communicative purposes and opportunities for interaction. The sixth principle is consolidation through spaced practice. Learning should be distributed across time rather than concentrated exclusively in a single intensive session. These principles can be organized into a practical model.

A five-stage neuropedagogical model for English listening

Stage 1: Preparation and attention. The teacher activates relevant prior knowledge and establishes a listening purpose.

Possible activities:

- prediction from pictures;
- key-word brainstorming;
- contextual questions;

- anticipation of vocabulary;
- discussion of the topic.

Teacher's objective: prepare attention without giving away the entire message.

Stage 2: Auditory perception

Students listen to relatively short sections of authentic or appropriately graded speech.

Activities can focus on:- identifying key words;
- recognizing word boundaries;
- distinguishing stressed and unstressed words;
- noticing connected speech;
- identifying intonation;
- recognizing repeated phrases.

At this stage, the teacher should avoid overwhelming learners with numerous questions.

Stage 3: Meaning construction

Learners combine linguistic information with context and previous knowledge.

Activities may include:
- identifying the main idea;
- sequencing events;
- matching speakers with opinions;
- making inferences;
- identifying attitudes;
- predicting what will happen next.

This stage emphasizes listening as active meaning construction.

Stage 4: Metacognitive regulation

Students reflect on their own listening.

Useful questions include:
1. What did I understand immediately?
2. What did I miss?
3. Why did I miss it?
4. Did I focus too much on individual words?
5. Did context help me?
6. What strategy will I use next time?

This stage is especially valuable because it converts listening from an external classroom task into a transferable learning skill.

Stage 5: Consolidation and transfer

Finally, learners use the newly processed language in another context.

They may:
- summarize the recording;
- retell the information;
- create a dialogue;
- answer a communicative problem;
- record their own response;
- teach the new information to a partner.

This final stage encourages learners to transfer newly acquired linguistic patterns into active language use.

The role of the teacher

A neuropedagogically informed English teacher is not expected to diagnose students' brains or determine their neural characteristics. Instead, the teacher becomes an informed

designer of learning experiences. The teacher observes learner behavior and asks pedagogically relevant questions:

- Are students losing attention?
- Is the audio too difficult?
- Are they trying to translate every word?
- Do they understand the global message?
- Can they use context to infer meaning?
- Are they becoming more independent?
- Does repeated exposure produce better recognition?

This approach is compatible with contemporary educational-neuroscience research, which emphasizes the importance of translating scientific evidence cautiously rather than converting neuroscience terminology directly into classroom prescriptions. [4]

Thus, the value of neuropedagogy lies less in providing a collection of “brain-based tricks” and more in encouraging evidence-informed instructional design.

Neuropedagogy and traditional listening methodology

It is important to emphasize that neuropedagogy does not invalidate established approaches to language teaching. Pre-listening, while-listening, and post-listening stages remain useful. Task-based learning, communicative language teaching, metacognitive instruction, extensive listening, and vocabulary development can all be incorporated into a neuropedagogical framework. The difference is primarily explanatory and design-oriented. For instance, a teacher may already know that repeated listening is useful. Neuropedagogy provides an additional perspective by connecting repetition with learning, adaptation, and consolidation. Similarly, teachers may already use prediction activities. A neuropedagogical interpretation highlights their role in directing attention and activating prior knowledge. Metacognitive listening instruction provides another example. Vandergrift's empirical research demonstrated that learners receiving process-oriented metacognitive listening instruction can show stronger comprehension outcomes than learners who simply listen to the same texts without guided attention to the listening process. [9] Therefore, neuropedagogy should be considered a complementary framework rather than a competing methodology.

Practical example of a neuropedagogical listening lesson. A 45-minute English listening lesson on the topic “A Student's First Day at University” can illustrate the proposed model.

Before listening — 8 minutes

The teacher shows a photograph of a university campus.

Students discuss:

- What can you see?
- What problems might a new student have?
- What questions might a new student ask?

Students predict five words or phrases that may appear in the recording.

First listening — 5 minutes

Students listen without taking detailed notes.

Although neuropedagogy offers a valuable perspective, several limitations must be acknowledged.

First, neuroscience findings should not be transformed into classroom recommendations without appropriate intermediate evidence. The relationship between brain mechanisms and educational practice is complex, and educational neuroscience continues to face challenges involving translation, methodology, and ecological validity. [2] Second, not every individual difference in listening can be explained through neuroscience. Vocabulary

knowledge, phonological awareness, motivation, prior learning experience, anxiety, first-language background, proficiency, and quality of instruction all influence listening performance.Third, brain plasticity should not be interpreted as evidence that any particular teaching technique automatically produces measurable structural changes. Neuroplasticity is a general biological capacity, and its educational consequences depend on the type, intensity, duration, and quality of learning experience. Fourth, classroom listening is considerably more complex than laboratory language-processing tasks. Real learners interact with teachers and classmates, experience emotions, encounter different accents, and operate under curricular and assessment constraints.

Finally, further empirical research is required to determine which specific neuropedagogical interventions produce reliable improvements in English listening comprehension across different age groups and educational contexts. Recent work on translating educational neuroscience into authentic school environments similarly identifies methodological heterogeneity and limited teacher preparation as continuing challenges.

Conclusion

The development of English listening comprehension competence requires more than exposure to audio materials and comprehension questions. Listening is a complex cognitive activity in which learners must coordinate auditory perception, attention, lexical recognition, working memory, contextual prediction, inferencing, emotional interpretation, and metacognitive regulation. Neuropedagogy provides a useful interdisciplinary perspective for understanding these processes. Evidence from educational neuroscience and second-language research suggests that language learning is connected with neuroplasticity and that cognitive processes such as attention, memory, and metacognition are central to successful learning.

For English listening instruction, this perspective supports several practical principles: prepare attention before listening, activate prior knowledge, manage cognitive demands, develop auditory processing progressively, use meaningful repetition, encourage prediction and inference, explicitly teach metacognitive strategies, incorporate emotional and social interaction, and provide opportunities for consolidation and transfer.However, neuropedagogy should not be presented as a collection of simplistic “brain-based” techniques. Its educational value depends on careful translation of neuroscientific evidence through cognitive and pedagogical research. The most productive relationship between neuroscience and English-language teaching is therefore interdisciplinary: neuroscience can help explain learning mechanisms; cognitive psychology can clarify processing; applied linguistics can explain language development; and pedagogy can transform these insights into meaningful classroom experiences.

Ultimately, the goal of neuropedagogical listening instruction is not to teach students about the brain. Its goal is to design learning environments in which the brain's natural capacity for attention, adaptation, memory, prediction, social interaction, and plasticity can be supported through purposeful and evidence-informed English language education.

THE LIST OF USED LITERATURE

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