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Research on the Application of Embodied Mind Mapping in English Grammar Learning

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English grammar learning is a core link in second language acquisition, yet the abstract rule system and fragmented learning mode easily cause the disconnection between knowledge memory and pragmatic application. Embodied mind mapping (EMM) integrates the physical participation core of embodied cognition theory with the knowledge visualization advantages of mind mapping, combining physical perception, situational interaction, and visual sorting. Based on embodied cognition, knowledge visualization, constructivist learning, and second language acquisition theories, this paper defines the core connotation and design principles of embodied mind mapping, explores its practical application strategies in English grammar learning, and constructs a concise curriculum design framework with corresponding application precautions. The research aims to provide a targeted theoretical and practical reference for English grammar teaching reform, and effectively promote learners' in-depth construction and flexible application of grammar knowledge.

Keywords: embodied mind mapping, English grammar learning, embodied cognition, knowledge visualization, second language acquisition

Introduction

English grammar is the foundation of language skills, and its mastery directly affects the efficiency and quality of second language acquisition (Ellis, 2006). Some learners, mostly dependent on mechanical memorization and practice, result in fragmented grammar knowledge and weak pragmatic competence (Wen, 2020). Traditional grammar teaching adopts one-way explanation, ignoring students' physical perception and situational interaction, which violates the basic "input-interaction-output" law of second language acquisition (Long, 1996).

Mind mapping, a classic knowledge visualization tool, has the advantage of integrating fragmented knowledge via its radial structure (T. Buzan & B. Buzan, 2013) but overemphasizes visual presentation and neglects physical participation. Embodied mind mapping (EMM) compensates for this deficiency by guiding learners to construct grammar knowledge through multi-sensory participation and situational interaction, forming a "physical perception—visual sorting—cognitive internalization—pragmatic output" loop.

Prior studies mostly discuss mind mapping or embodied cognition separately in English grammar teaching. This paper focuses on the integrated application of mind mapping and embodied cognition, aiming to enrich relevant research and improve the effectiveness of English grammar teaching and learning.

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Theoretical Foundation of Embodied Mind Mapping

Embodied Cognition Theory

As a core achievement of contemporary cognitive science, embodied cognition theory abandons the traditional mind-body dualism, proposing that cognition is the product of dynamic interaction between the body, brain, and external environment, rather than an abstract thinking activity independent of the body (Varela, Thompson, & Rosch, 1991). Knowledge construction and internalization depend on physical perception, movement, and experience; the body is the carrier of cognition, and the external situation provides the necessary interactive field (Wilson, 2002). In grammar learning, this theory requires transforming abstract rules into concrete physical perception through body movements and situational simulation, helping learners grasp the essential connotation of grammar rules.

Knowledge Visualization Theory

Originating from the cross integration of cognitive psychology and educational technology, knowledge visualization refers to constructing and transmitting complex knowledge systems through graphics, images, and symbols to promote learners' understanding, memory, and application of knowledge (Novak & Gowin, 1984). Its core value is to convert abstract knowledge logic into an intuitive visual structure, conforming to the human brain's associative memory mode and reducing cognitive load. Mind mapping, a typical tool of knowledge visualization, presents the logical relationship of knowledge through hierarchical radial branches, effectively integrating scattered grammar knowledge into a systematic network (Zhang, 2009), and providing a visual framework basis for the design of embodied mind mapping.

Constructivist Learning and Second Language Acquisition Theories

Constructivist learning theory holds that learning is not passive reception of external information, but an active process of learners' interpreting, integrating, and constructing meaning based on original knowledge and experience (Piaget, 1970), emphasizing the construction of interactive teaching situations. The "interaction hypothesis" of second language acquisition theory points out that real language interaction is the key to language knowledge internalization and application (Long, 1996). The two theories jointly support the application of embodied mind mapping: Its construction process is an active grammar knowledge sorting process, and physical participation and situational interaction provide the necessary experience and field for this process, promoting the transformation of grammar knowledge into pragmatic competence.

Embodied Mind Mapping and Its Application Principles

EMM is an innovative learning paradigm that deeply integrates embodied cognition theory with mind mapping tools. It takes English grammar knowledge as its core, uses the visualized radial hierarchical structure as its carrier, integrates embodied elements such as body movements, multi-sensory experience, and real situational interaction, and guides learners to complete the systematic sorting and embodied internalization of grammar knowledge in the whole process of "drawing by hand—physical representation—situational interaction—cooperative construction", ultimately realizing the transformation of grammar knowledge from "symbol memory" to "pragmatic application".

The design of EMM integrates vision, kinesthesis, hearing, and other multi-sensory participation, takes body movements as an important carrier of grammatical cognition, and realizes the unity of body and mind in cognitive construction. Meanwhile, EMM follows the internal logic of grammar knowledge, and builds a "general-specific-

detailed" hierarchical branch framework so as to systematically integrate fragmented knowledge. Besides, EMM combines abstract grammar rules with real pragmatic situations, matches each grammar branch with corresponding application scenarios and typical examples, and thus helps to solve the problem of learning-application disconnection.

Practical Application Strategies of EMM in English Grammar Learning

Embodied Sorting: Constructing a Systematic Grammar Knowledge Framework

Embodied sorting guides learners to build a systematic knowledge network through "drawing by hand + physical representation". Take basic English sentence structures as an example: Learners draw a central circle with both hands and orally state the theme; take simple, complex, and compound sentences as first-level branches (distinguished by arm gestures); refine the five basic structures of simple sentences as second-level branches (corresponding to fingers while reading examples); mark error-prone points with colors and body movements, transforming abstract knowledge into concrete experience.

Embodied Understanding: Deepening the Essential Cognition of Abstract Grammar Rules

For abstract grammar knowledge such as tenses and non-finite verbs, embodied understanding transforms abstract rules into concrete physical experience through "physical simulation + situational perception". Take English tenses as an example: Learners use arm stretching to represent the past-present-future time axis, use exclusive gestures for different tenses (e.g., hands behind the back for simple past) while reading examples, and compare easily confused tenses through movements to grasp their essence.

Embodied Application: Linking Grammar Knowledge and Pragmatic Situations

Embodied application links "knowledge-situation" through "situational simulation + cooperative construction". Take attributive clauses as an example: Groups build mind maps (with restrictive/non-restrictive clauses as branches), match them with real scenarios, conduct role-play with attributive clauses, and perfect the map to form a "grammar rules—application scenarios—typical sentence patterns—error-prone points" framework.

Embodied Transfer: Promoting the Cross-Skill Transfer of Grammatical Ability

Embodied transfer promotes cross-skill application through "knowledge expansion + multi-modal practice". Take non-finite verbs as an example: Learners supplement listening, speaking, reading, and writing scenarios to the mind map, conduct multi-modal practice (marking in listening, gesturing in speaking, etc.), and update the map regularly to integrate grammar with comprehensive language skills.

Curriculum Design Framework

A four-stage integrated curriculum design framework helps to realize the deep integration of EMM and grammar teaching, and improve the systematicity and effectiveness of teaching.

Pre-class preparation: Teachers determine core grammar points and design differentiated embodied mind mapping templates (basic, advanced, challenge) for learners at different levels, and design preview tasks; learners sort out original knowledge, try to draw the basic framework, and mark knowledge blind spots and questions.

In-class implementation: The core stage with full embodied interaction, divided into four steps: Teachers explain core rules through body movements to reduce abstraction; learners improve the mind mapping with physical representation; groups conduct situational simulation and supplement core content to the mind mapping;

groups display and evaluate the mind mapping, with teachers providing targeted guidance to form a classroom consensus version.

After-class consolidation: Learners supplement new examples and error-prone points from after-class exercises to the mind mapping, and review grammar rules through body movements to deepen memory; teachers assign embodied tasks (e.g., shooting oral expression videos, writing short stories) to combine the mind mapping with real language use.

Diversified evaluation: Abandon the single paper-and-pencil test, construct an evaluation system combining 60% process evaluation (mind mapping drawing, embodied interaction, group cooperation) and 40% result evaluation (grammar accuracy in tests, oral fluency, writing sentence pattern richness); encourage self-evaluation and peer evaluation to cultivate autonomous learning ability.

To achieve the full potential effect of EMM, the following precautions should be taken into consideration: adhere to knowledge logic, provide differentiated templates and embodied tasks for learners with different grammar foundations, physical perception abilities, and learning styles, guide learners to continuously supplement and revise their EMM with new knowledge and cases, and make full use of modern technologies such as VR/AR and audio-video resources to create real language situations in EMM.

Conclusion

EMM is an innovative learning paradigm integrating embodied cognition and mind mapping, combining physical participation, situational interaction, and knowledge visualization. It solves common English grammar learning problems such as fragmentation, superficiality, and learning-application disconnection. Based on four core theories, this paper defines its connotation, four design principles, four-dimensional application strategies (sorting, understanding, application, transfer), and a four-stage curriculum framework with precautions.

Its core value lies in two aspects: integrating fragmented grammar knowledge to deepen memory and understanding, and transforming traditional passive memory into active physical experience to promote knowledge transformation from “symbol memory” to “pragmatic application”. It also provides a new teaching paradigm, promoting teachers’ role transformation and student-centered classroom upgrading.

Future research can focus on its digital upgrading (combining AI and big data) and empirical research on different learners, to provide support for its popularization. In short, it offers targeted methods for grammar learning, promoting more efficient and scientific English grammar teaching.

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