An empirical study of the influence of circuit theory on English listening skills at the university using the design of preliminary and subsequent testing

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Abstract

In university English education, listening instruction holds an extremely important position, while listening comprehension is a key yet challenging aspect of students' learning process. However, students often overly emphasize vocabulary, grammar, pronunciation, or accent when trying to improve their listening performance. The purpose of this paper is to analyze students' attitudes and abilities in listening from the perspective of Schema Theory, and to discuss the strategies and application of Schema Theory in English listening comprehension. The study includes pre- and post-listening tests and questionnaires conducted with English major undergraduates, aimed at identifying and addressing challenges encountered in the listening process to enhance their English listening skills. The results show that some learners consciously apply Schema Theory in their listening comprehension. Therefore, the outcomes of these tests and surveys underscore the effectiveness of Schema Theory in enhancing the learning of English listening skills.

Introduction

Listening instruction is increasingly recognized as a crucial component of university English education, yet listening comprehension remains one of the weakest aspects for most students.

In traditional teaching models, listening instruction is often limited to playing audio, listening, and checking answers, without providing students with background knowledge. This approach views students as passive recipients. However, listening is an active process, a complex integration of language knowledge, sociocultural background, and the listener's personal experiences in information processing.

According to the author's research, current university English listening instruction still largely follows a traditional pattern of «teaching vocabulary, playing audio, checking answers, and repeated listening». However, the process of listening comprehension is not a passive psychological process of absorbing acoustic signals. Rather, it is a dynamic interaction between the input information and the pre-existing knowledge in the listener's mind. The existing knowledge in the brain is referred to as background knowledge, and the structure of this knowledge, known as a schema, is both the premise and the result of all information processing activities.

This article aims to explore the application of schema theory in the context of college English listening instruction. It involves practical teaching activities to construct a new model of English listening instruction based on Schema Theory. The model's effectiveness in enhancing college English listening instruction is assessed through tests evaluating students' comprehension and learning outcomes. Additionally, the study examines whether applying Schema Theory can address shortcomings in current teaching methods and effectively improve students' English listening comprehension skills.

Psychologists, through prolonged observation and research on natural listening phenomena in life, have discovered that during listening comprehension, people first receive external linguistic information through auditory organs. Then, they connect this received language information with knowledge and experiences stored in the brain. Based on this knowledge and experience, they judge, filter, and restructure the received information, generate associations, and thus deduce the speaker's true intent, which is understanding. In this process, the listener's knowledge and experience play a significant role. That is to say, the application of the listening comprehension system involves two types of knowledge: linguistic knowledge and non-linguistic knowledge (or encyclopedic knowledge). Schema theory, as a newly developed theory in cognitive linguistics, aids in the application of English listening teaching by helping students organically combine linguistic and non-linguistic knowledge and rationally comprehend listening, facilitating the smooth progression of listening instruction.

Listening instruction holds a significant position in university English education, and listening comprehension has always been a crucial yet challenging aspect of college students' English learning. With recent revisions in the English teaching syllabus, the importance of listening comprehension in college English proficiency exams has increased.

In recent years, researchers have made attempts to enhance the effectiveness of English listening instruction and strengthen students' listening skills. Introducing schema theory into English listening teaching has become one of the significant topics explored in the teaching community. Initially, schema theory was more commonly applied to reading instruction. However, an increasing number of English educators have started applying it to listening classes within new teaching models, achieving positive results.

Applying schema theory to listening comprehension enables students to shift from traditional passive listening to active, thoughtful engagement. It involves using existing background knowledge in the brain to interact with incoming information, achieving effective listening results. According to schema theory, listeners can enhance their understanding of new information by effectively utilizing existing knowledge. Therefore, helping students to effectively activate relevant schemas becomes key to improving college English listening instruction.

The purpose of this study stems from the lack of theoretical research on the formation of students' English listening comprehension skills in methodologies, and the absence of systematic innovation in methods, skills, and means. The study aims to establish and develop capabilities that effectively enhance English listening comprehension. This rephrasing emphasizes the academic necessity and urgency to address these gaps in understanding and methodological development for improved English listening skills.

Materials and methods

The term «schema» originates from Greek and first appeared in ancient Greek philosophy and psychology. The concept of schema was initially proposed by Immanuel Kant in 1781, who discussed its philosophical significance, suggesting that the human brain contains pure concepts, with schemas acting as the link between concepts and perceptual objects. L. Pearson (1982) defined schemas as mental images or associations formed upon hearing or reading information. Cook (1994) described schemas as «preexistent knowledge» or «background knowledge» in the mind. Widdowson (1983) viewed schemas as cognitive

frameworks that orderly store information in long-term memory. Similarly, Rumelhart (1980) considered schemas as the sum of all knowledge, with each person storing various schemas or knowledge in their brain. Cognitive psychologist Bartlett, in his work «Remembering» (1932), described schemas as an active developing pattern, introducing the schema concept in the study of reading psychology.

Chu-Ming Wang (1990) views schema as a convenient condition for retrieving discourse-related information from memory. Yanfang Zhao (1999) proposes that schema encompasses any form of events and objects, representing a summary of the human memory's combination and classification of all knowledge. While interpretations of «schema» vary among scholars, generally, schema is considered a form of knowledge representation in the brain, organically organizing new things with existing knowledge for easier information storage and processing.

Overall, current research in embodied cognition exhibits two distinct characteristics: firstly, a shift in theoretical research from macro to micro perspectives, and secondly, a strong emphasis on applied research. Schema theory provides an excellent research perspective for action research in college English listening, significantly contributing to the field.

«Schema» refers to the way existing knowledge is stored in the brain. There are various schemas in the human brain, and encountering new things requires understanding and interpreting them through existing information schemas. When students engage in listening comprehension, three types of schemas determine their understanding: linguistic schema, content schema, and formal schema. Linguistic schema involves the ability to recognize words, phrases, and sentences in the material, serving as a foundation. Content schema refers to the familiarity with the topic or background knowledge related to the material. Formal schema pertains to the familiarity with the genre of the material.

According to Schema theory, listening involves more than just passively receiving sound. It's an interactive, bidirectional process where a listener's existing knowledge plays a crucial role. Instead of focusing on every single word, listeners leverage their prior knowledge and apply strategies like prediction and confirmation to derive meaning from what they hear. Essentially, listening is about creating meaning through a dynamic interaction between the listener and the text, emphasizing that the process is an active and interactive one aimed at facilitating communication.

To rigorously assess the impact of schema theory on the pedagogy of English listening comprehension among students in university, the study deployed a methodological approach encompassing both pre-test and post-test evaluations. These evaluations were strategically administered to gauge students' comprehension skills prior to and subsequent to an instructional intervention that incorporated schema theory principles.

The study was conducted with a cohort of eight sophomore students specializing in English at the K. G. Razumovskiy Moscow State University of Technologies and Management, Russia, serving as the participant sample.

Test Instruments. Employing two distinct yet comparable sets of English listening tests, both uniform in structure and calibrated in difficulty, allowed for a standardized assessment of listening skills. Experimental Design: The experimental framework was bifurcated into two critical phases: the pre-test phase, where students' baseline listening comprehension levels were measured, and the post-test phase, which followed an educational intervention. This intervention consisted of a schema-theory-informed session wherein the instructor elucidated pertinent background knowledge and facilitated the construction of new cognitive schemas among students.

Upon conclusion of the experimental phases, a survey was administered to capture the students' perceptions and cognitive responses toward English listening comprehension. Analytical rigor was applied in comparing the correctness rates between the pre-test and post-test results to validate the effectiveness of schema theory in enhancing listening comprehension. This structured approach provided a comprehensive understanding of schema theory's applicability and effectiveness in improving the acquisition of English listening skills in an academic setting.

Results and discussion

The research involves eight second-year English major students from a university in Russia, which named K.G. Razumovskiy Moscow State University of Technologies and Management. It utilizes two sets of

English listening tests with identical formats and similar difficulty levels. The experimental procedure consists of pre-test and post-test stages. In the pre-test, students take the test directly, while in the post-test, they undergo the test after receiving instruction based on schema theory and building new schemas. Data collection and analysis involve post-experiment surveys to gather students' attitudes and cognition about English listening comprehension. The effectiveness of schema theory is analyzed by comparing the accuracy rates in the pre-test and post-test.

Eight second-year English major students from K.G. Razumovskiy Moscow State University of Technology and Management, comprising four male and four female students, completed the test.

The pre-test and post-test have consistent question types and equivalent difficulty levels, each comprising five major questions totaling 23 points. Question one is a direct answer question worth 1 point. Question two consists of four multiple-choice questions, each worth 1 point, totaling 4 points. Question three is a fill-in-the-blank question with two parts, each part worth 1 point, amounting to 2 points. Question four is a chart question with ten blanks, each blank worth 1 point, totaling 10 points. Question five involves true or false statements, with six parts, each worth 1 point, totaling 6 points.

Detailed test results are as follows.

Table 1. Pre-Test Score

Pre-Test Score						
Student	Test 1	Test 2	Test 3	Test 4	Test 5	All
Student 1	1	4	2	4	4	15
Student 2	1	4	2	6	4	17
Student 3	1	4	2	0	4	11
Student 4	0	4	2	4	5	15
Student 5	0	4	1	3	4	12
Student 6	0	4	1	2	3	10
Student 7	0	4	2	2	4	12
Student 8	1	4	2	5	5	17

Table 1 is the Pre-Test Total Score sheet, with a total score of 23 points and an average score of 13.6 points.

Table 2. Post-Test Score

Post-Test Score						
Student	Test 1	Test 2	Test 3	Test 4	Test 5	All
Student 1	1	4	2	5	4	16
Student 2	1	4	2	5	6	18
Student 3	1	4	2	3	4	14
Student 4	1	4	2	5	4	16
Student 5	1	4	2	6	3	16
Student 6	1	4	2	4	3	14
Student 7	1	4	2	6	5	18
Student 8	0	4	2	8	5	19

Table 2 is the Post-Test Total Score sheet, with a total score of 23 points and an average score of 16.4 points.

1. The first question involved listening to a dialogue and answering questions to determine the relationship between the speakers. In the pre-test, 4 students answered correctly, and in the post-test, 7 students

answered correctly, which means the pre-test had an accuracy rate of 50%, and the post-test had an accuracy rate of 87.5%.

2.   The second question was a multiple-choice question based on a dialogue, with four options to choose from. Both the pre-test and post-test had an accuracy rate of 100%.

3.   The third question involved listening to a dialogue about «scheduling a time», with two fill-in-the-blank questions. In the pre-test, 2 students each made one mistake, while the post-test had an accuracy rate of 100%.

4.   The fourth question was a chart-based question, where students were required to fill in 10 blanks based on the content of the dialogue. The results of the two tests were as follows.

Table 3. The results of Test 4 in Pre-Test and Host-Test

Student	Pre-Test Score	Post-Test Score
Student 1	4	5
Student 2	6	5
Student 3	0	3
Student 4	4	5
Student 5	3	6
Student 6	2	4
Student 7	2	6
Student 8	5	8
Average Score	3.25	5.25
Accuracy	32.50%	52.50%

For the fourth question, a chart-based task with 10 blanks, the accuracy rate in the pre-test was 32.5%, and in the post-test, it improved to 52.5%. The fifth question involved listening to material and judging whether statements were true or false. There are a total of 6 sentences, and the answering situation is as follows in the next table.

Table 4: The results of test 5 in Pre-test and Post-test

Student	Pre-Test Score	Post-Test Score
Student 1	4	4
Student 2	4	6
Student 3	4	4
Student 4	5	4
Student 5	4	3
Student 6	3	3
Student 7	4	5
Student 8	5	5
Average Score	4.125	4.25
Accuracy	41.25%	42.50%

For the fifth question, where students listened to material and judged the correctness of six sentences, the accuracy rate was 41.25% in the pre-test and slightly increased to 42.50% in the post-test.

The listening materials for the first and second questions were dialogues. In the pre-test, the dialogue was between a husband and wife, with the husband on a business trip staying in a hotel, the wife tending to the garden at home, and their child playing, depicting a typical family scenario. The post-test involved a conversation between two colleagues discussing routine work matters. Students, faced with these familiar life and work scenes, could effectively construct content and linguistic schemas, fully understanding the dialogue's context.

In explaining these dialogues, the teacher introduced relevant background knowledge and professional terminology, clarifying the meanings of specific terms used. Additionally, the teacher supplements relevant scenarios with common sentence patterns, enabling students to quickly grasp information, discern the relationships between characters in the dialogue, and thereby understand the content of the conversation more accurately.

The improvement in accuracy rate for the first question, from 50% in the pre-test to 87.5% in the post-test, fully demonstrates the importance of establishing a linguistic schema. The supplementation and activation of a complete linguistic schema enabled students to discern words and sentence patterns during dialogue comprehension. Furthermore, by understanding the content based on language chunks and meaningful groups, students were able to enhance both the accuracy of their comprehension and the speed of their responses.

The listening materials for the third and fourth questions were also dialogues, with both the pre-test and post-test featuring conversations set in a work context about colleagues arranging meeting times. These listening exercises were more challenging, requiring students to capture key information and details. The test results showed a significant improvement in accuracy rates, with the third and fourth questions moving from 75% and 32.5% in the pre-test to 100% and 52.5% in the post-test, respectively.

Before the post-test, the teacher consciously established schemas for the students: In terms of linguistic schema, emphasis was placed on enhancing phonetic skills. The characters in the dialogues came from different countries, requiring students to understand the pronunciation characteristics of people from various nations to accurately interpret the information heard. Regarding the content schema, the teacher incorporated reading materials about domestic and international cultural knowledge, enriching the students' background understanding and thereby facilitating a more comprehensive comprehension of the dialogues.

During the listening process, students utilized the background schemas they had constructed, analyzing and processing new information under the teacher's guidance using different information processing models. In terms of language, students applied their knowledge from the pre-listening phase's phonetic schema, enabling more accurate information acquisition. As evidenced by the bar chart, there was a noticeable improvement in the post-test results for the fourth question compared to the pre-test. This visually demonstrates how, under the teacher's guidance, students built richer schemas, effectively engaging their learning enthusiasm and enhancing their comprehension of the listening materials. The data affirm that a college English listening instruction model based on schema theory holds significant importance for listening instruction.
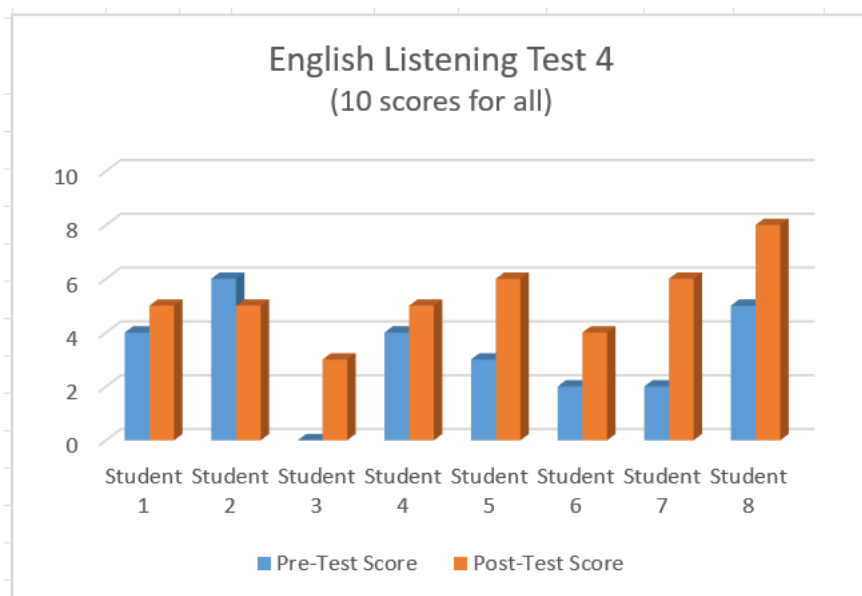

Figure 1. English listening test 4

Furthermore, the author found in the data analysis that the incomplete responses to the fourth question were largely due to the students' limited vocabulary. For example, students mistook the word «fair» for «fare,»

wrote the place name «Prague» as «Praga,» and misheard «strategy» and «clients» as «sails» and «plants» due to unclear pronunciation. In future teaching, it is essential for teachers to focus on enhancing students' vocabulary and examining the accuracy of their word memorization. This approach will not only improve their language proficiency but also their ability to accurately comprehend and interpret listening materials.

The listening material for the fifth question saw a slight improvement from a pre-test accuracy rate of 41.25% to a post-test accuracy rate of 42.5%. While the increase in the true or false question performance was not significant, it showed a minor progression. The bar chart below illustrates that the accuracy rates fluctuated, with some increases and decreases, but overall remained relatively stable.
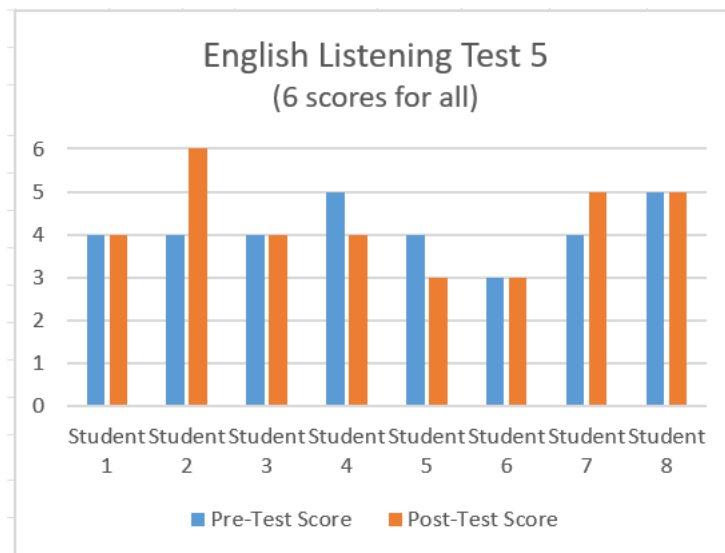

Figure 2. English Listening Test 5

In the later stages of this study, the author conducted a questionnaire survey with 8 students to assess their English listening abilities and needs. The survey was divided into four parts: the students' personal background information, the difficulties they encounter in English listening, their habits in learning English listening, and their needs for receiving tutoring assistance.

The survey results indicated that the majority of the students assessed their English listening skills as good. A minority of students considered their listening skills to be average, and an even smaller proportion thought they had excellent listening skills. In terms of the main challenges in English listening, most students pointed out that insufficient vocabulary was their biggest problem. Other common issues included the fast pace of the listening materials, difficulty in understanding technical terms, accent barriers, complex sentence structures, and a lack of relevant cultural background knowledge. Furthermore, the most significant factor affecting students' understanding of English listening was identified as a lack of sufficient listening practice, followed by a lack of knowledge in specific fields.

In this study, the author conducted a statistical and analytical examination of students' English listening habits. The results revealed that the majority of students maintained a frequency of practicing English listening skills several times a week or even daily, with only a minority occasionally engaging in such practice. The primary materials used for listening exercises included international news, English songs, and English movies, followed by cultural and entertainment news, English stories, English dialogues, and political news.

Regarding their learning methods, most students preferred to enhance their listening skills by listening to English news broadcasts and watching English news videos online. Additionally, they engaged in reading English articles and participated in listening seminars or training classes. In terms of the need for English listening guidance, the majority of students tended to seek help from teachers and classmates, while some utilized English listening software or read English materials in relevant fields to expand their vocabulary.

The students expressed a general desire for schools to provide more listening resources, such as organizing listening seminars, offering English news resources in specialized fields, and establishing dedicated

listening tutoring courses. They also anticipated guidance in listening strategies and explanations and practice with professional terminology. In the collection of free opinions, some students specifically requested more modern songs, English stories, or English movies as listening materials.

In summary, this study reveals the habits and needs of students in learning English listening, which is of significant importance for enhancing the effectiveness of English listening instruction.

Based on the aforementioned research content and integrating Schema Theory in English listening instruction, we can summarize and analyze as follows:

1. Application of Schema Theory: Schema Theory emphasizes the impact of knowledge structures on information processing. In English listening instruction, teachers can activate students' prior knowledge (schemas) to help them better understand and remember listening materials. For instance, using familiar topics such as international news and cultural entertainment as listening materials can enhance their comprehension and interest.

2. Diversity of Listening Materials: The survey indicates that students show diversity in their choice of listening materials. This suggests that teachers should include a variety of materials in designing listening exercises, including news, songs, movies, etc., to meet the different needs of students. This helps in building new schemas, thereby facilitating English listening comprehension.

3. Overcoming Listening Challenges: Challenges faced by students during listening, such as limited vocabulary and fast speech, should be addressed through specific strategies. For example, gradually increasing the difficulty of listening materials can help students adapt to different speeds and styles of English speech.

4. Combining Technology and Traditional Methods: The application of modern technology (like English listening software) combined with traditional reading and classroom learning can offer a more comprehensive learning experience. Using technological tools, students can engage in autonomous learning anytime and anywhere while maintaining the systematic nature of classroom learning.

5. Targeted Teaching Strategies: Based on students' needs for understanding professional terminology and listening strategies, teachers should design targeted teaching activities, such as special lectures and vocabulary expansion exercises. Employing Schema Theory in teaching can help students connect existing and new schemas in their minds, enhancing English listening comprehension.

6. Cultivating Cultural Awareness and Global Perspective: Providing listening materials from different cultural backgrounds, such as international news and foreign movies, can help students broaden their horizons and strengthen their intercultural communication skills.

In conclusion, English listening instruction should consider students' needs and challenges, combine Schema Theory and modern technology, and provide diverse, targeted teaching methods to improve students' listening comprehension and overall language proficiency.

Conclusion

Schema theory plays a vital role in college English listening instruction. It transforms the traditional passive learning approach of «listen-and-answer» into an active and engaging model where students integrate language with background knowledge. This shift has effectively enhanced students' listening comprehension skills and increased their interest in listening materials. Although the application of schema theory in college English listening instruction is still in its exploratory stage, it provides a fresh perspective for innovative teaching methodologies. Therefore, teachers should more actively explore and practice applying schema theory in their instruction. By helping students build a broader range of schemas and enriching their background knowledge, teachers can effectively improve their students' listening comprehension skills, enabling them to master this essential language ability genuinely.

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Эмпирическое исследование влияния теории схем на навыки английского аудирования в университете с использованием дизайна предварительного и последующего тестирования

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Аннотация
В университетском обучении английскому языку обучение аудированию занимает чрезвычайно важное место, в то время как понимание на слух является ключевым, но сложным аспектом процесса обучения студентов. Однако студенты часто чрезмерно подчеркивают словарный запас, грамматику, произношение или акцент, пытаясь улучшить свои навыки аудирования. Цель этой статьи -

проанализировать отношение и способности студентов к аудированию с точки зрения теории схем, а также обсудить стратегии и применение теории схем в понимании английского языка на слух. Исследование включает в себя тесты до и после прослушивания и анкетирование, проведенные со студентами старших курсов по английскому языку, направленные на выявление и решение проблем, возникающих в процессе прослушивания, для улучшения их навыков аудирования на английском языке. Результаты показывают, что некоторые учащиеся сознательно применяют теорию схем при понимании на слух. Таким образом, результаты этих тестов и опросов подчеркивают эффективность теории схем в совершенствовании навыков аудирования на английском языке.

Ключевые слова

теория схем; преподавание английского языка на слух; предварительное и последующее тестирование; понимание английского языка на слух; обучающие препятствия; учебные стратегии.

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