

# THE ADVANTAGES OF USING EMBODIED LEARNING TECHNOLOGY TO IMPROVE PHONETIC SKILLS IN ENGLISH COMPARED TO TRADITIONAL TEACHING METHODS

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*This study deals with the advantages of using embodied learning technology to improve phonetic skills in English compared to traditional teaching methods. Embodied learning recognizes the interconnectedness of body, mind, and environment throughout the learning process, with cognitive processes resulting from a complex interplay between the nervous system, physical sensations, motor activity, and learning environment.*

*The research methodology included observation and systematic monitoring of students' phonological skill acquisition, questionnaires and surveys gathering student experiences with embodied learning techniques, audio analysis comparing speech samples before and after implementation, and case studies examining successful applications. A comprehensive survey was conducted among teachers and students at two Ukrainian higher education institutions – Berdiansk State Pedagogical University and Municipal Institution "Kharkiv Humanitarian Pedagogical Academy" of Kharkiv City Council, involving 4 teachers and 18 students who used augmented reality (AR) applications for English phonetics learning.*

*The teachers used various AR applications, including Mondly AR, Lingokids AR, ELSA Speak, Speechling, Fluent.ai, Phonetics Focus, and ARTranslate. Results showed that 78 % of teachers noted significantly accelerated pronunciation formation processes, while 85 % of students found AR applications made phonetics learning more understandable and interesting. All 18 students demonstrated significant progress in pronouncing problematic sounds, with complete correction achieved in typical Ukrainian student errors such as final voiced consonant devoicing, interdental sound replacement, and incorrect /w/ pronunciation.*

*The findings indicate that phonetic skills acquired through embodied learning methods are significantly more stable long-term than traditional approaches, as they create deeper neural connections through multi-sensory engagement. The study concludes that combining traditional approaches with modern AR technologies provides optimal results for English phonetic skill development, offering a systematic understanding alongside personalized, interactive learning experiences.*

**Keywords:** embodied learning; phonetic skills; English language teaching; augmented reality; pronunciation training; educational technology.

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## ПЕРЕВАГИ ВИКОРИСТАННЯ ТЕХНОЛОГІЇ ВТІЛЕНОГО НАВЧАННЯ ДЛЯ ПОКРАЩЕННЯ ФОНЕТИЧНИХ НАВИЧОК З АНГЛІЙСЬКОЇ МОВИ ПОРІВНЯНО З ТРАДИЦІЙНИМИ МЕТОДАМИ ВИКЛАДАННЯ

*У поданій статті розглядаються переваги технології втіленого навчання для покращення фонетичних навичок з англійської мови порівняно з традиційними методами. Втілене навчання враховує взаємозв'язок тіла, розуму та*

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наволютинного середовища у процесі навчання через складну взаємодію нервової системи, фізичних відчуттів та рухової активності.

Дослідження проводилося серед викладачів та студентів Бердянського державного педагогічного університету та КЗ “Харківська гуманітарно-педагогічна академія”, залучивши 3 викладача та 18 студентів, які використовували AR-додатки для вивчення англійської фонетики (Mondly AR, ELSA Speak, Speechling та інші).

Результати показали, що 78 % викладачів відзначили значне прискорення формування вимови, а 85 % студентів вважали AR-додатки більш зрозумілими та цікавими. Усі 18 студентів продемонстрували значний прогрес у вимові проблемних звуків, повністю виправивши типові помилки українських студентів: оглушення дзвінких приголосних у кінці слів, заміну міжзубних звуків та неправильну вимову /w/.

Дослідження встановило, що фонетичні навички, набуті через втілене навчання, є значно стабільнішими довгостроково завдяки створенню глибших нейронних зв'язків через багатосенсорне залучення. Комбінування традиційних підходів з сучасними AR-технологіями забезпечує оптимальні результати для розвитку англійських фонетичних навичок.

**Ключові слова:** втілене навчання; фонетичні навички; викладання англійської мови; доповнена реальність; тренування вимови; освітні технології.

**I**ntroduction. The embodied learning approach recognizes that learning emerges from the dynamic interconnection of body, mind, and environment rather than isolated cognitive processes. This pedagogical framework operates on the principle that cognition results from complex interactions between the nervous system, physical sensations, motor activity, and environmental context, challenging traditional views of learning as purely mental activity.

The theoretical foundations of embodied learning trace back to John Dewey's experiential education philosophy in works such as “Democracy and Education” (1916) and “Experience and Education” (1938), which advocated for active student engagement and real-world application of classroom knowledge. The field gained significant momentum in the 1980s when Lakoff and Johnson established embodied cognition as a distinct theoretical framework in “Metaphors We Live By” (1980). Empirical validation emerged through the 1990s neuroscience research, particularly Rizzolatti's discovery of mirror neurons, which demonstrated identical neural activation patterns during both action execution and observation. Varela, Thompson, and Rosch's “The Embodied Mind” (1991) further conceptualized cognition as contextual organism-environment interaction.

**Analysis of recent research and publications.** Many educators and researchers have investigated the application of embodied learning principles in educational contexts, particularly their impact on cognitive development and language acquisition. S. Gallagher (2005) and A. Glenberg have contributed to the theoretical foundation of embodied cognition, with Gallagher's “How the Body Shapes the Mind” examining the body-cognition relationship and Glenberg focusing on deep cognition in reading and language acquisition. R. Pfeiffer and J. Bongard (2007) explored the connection between intellect and physiological experience in “How the Body Shapes Our Thoughts: A New Look at Intellect”, while G. Claxton (2015) examined bodily expressions of intelligence in “Intelligence in the Flesh”. M. Macedonia has been researching movement

and gesture integration in foreign language learning since 2010, demonstrating the value of physical engagement in the learning process. Johnson-Glenberg M. has specialized in incorporating technology, particularly augmented reality, into embodied learning environments, while S. Beilock (2015) examined the thought-movement relationship in “How the Body Knows the Heart”. Additionally, D. Casasanto has investigated embodied mechanisms of language and social cognition, and S. Goldin-Meadow is renowned for her studies on gesture's role in learning and cognitive development. L. Shapiro (2019) provided comprehensive examination of embodied cognition's scientific and philosophical foundations in “Embodied Cognition and its Implications for Education”, while Nathan (2022) advanced the field by establishing that embodied learning “advances learning, instruction, and the design of educational technologies by rethinking the learner as an integrated system of mind, body, and environment”, Nathan, 2022 creating a multifaceted understanding of physiological experience's vital role in learning processes. Dubrova et al. (2025) examined digital tools for improving phonetic skills in English.

**Research objectives.** We noticed a lack of investigation specifically related to the comparative effectiveness of embodied learning methods versus traditional approaches in English phonetic skill development. While researchers like M. Macedonia have demonstrated the value of movement and gesture integration in foreign language learning, and M. Johnson-Glenberg has explored technology integration in embodied learning environments, the systematic comparison of embodied learning techniques with conventional phonetic instruction methods remains relatively unexplored. In this context, the main goal of our work is to evaluate the advantages of using embodied learning technology, particularly augmented reality applications, to improve phonetic skills in English compared to traditional teaching methods. Embodied learning, which recognizes the interconnectedness of body, mind, and environment throughout the learning process, offers a promising alternative where cognitive

processes result from complex interplay between the nervous system, physical sensations, motor activity, and learning environment.

In this article, we explore the practical implementation of AR-based embodied learning techniques for English phonetics instruction among Ukrainian higher education students. We examine the theoretical foundations of embodied learning in language acquisition, analyze the effectiveness of various AR applications (Mondly AR, Lingokids AR, ELSA Speak, Speechling, Fluent.ai, Phonetics Focus, and ARTranslate), and provide empirical evidence of improved pronunciation outcomes. Our research methodology included systematic observation of phonological skill acquisition, questionnaires gathering student experiences, audio analysis comparing pre- and post-implementation speech samples, and case studies from Berdyansk State Pedagogical University and Municipal Institution "Kharkiv Humanitarian Pedagogical Academy". The study demonstrates that embodied learning approaches create more stable long-term phonetic skills through multi-sensory engagement, offering significant advantages over traditional instruction methods for addressing typical Ukrainian student pronunciation challenges.

**Presentation of the main research material.** Research has identified five fundamental principles of embodied learning: enhanced learning through multi-sensory channel integration (kinesthetic, tactile, auditory, and visual), motor activity facilitating cognitive processing and information storage, contextual learning within specific physical and sociocultural environments, emotional experiences linked to bodily engagement increasing motivation, and social learning through observation, imitation, and cooperative activities. The relevance of investigating embodied learning in foreign language education stems from its proven effectiveness in phonetic instruction, where physical movements enhance the acquisition of phonetic elements, articulation, and prosodic features. The integration of virtual and augmented reality technologies since the 2010s has expanded implementation possibilities, creating interactive environments that simultaneously develop emotional intelligence, metacognitive abilities, and subject knowledge, making this pedagogical approach particularly significant for contemporary educational research and practice.

Obviously, it is impossible to examine the efficacy of embodied learning without considering both traditional and contemporary teaching strategies, as each has pros and cons. It is common knowledge that learning to pronounce words correctly is crucial to learning a foreign language. There are several ways to improve these abilities, from the newest technological developments in the digital age to more conventional (classical) methods that have been used for a long time.

The advantages and disadvantages of each approach should be considered while choosing the best learning procedure.

Traditional methods include the use of transcription and phonetic exercises. Their advantages include a systematic approach to learning the phonetic system of the language, creating a clear understanding of the articulatory characteristics of each sound, providing an opportunity to work out new words independently with the help of transcription, developing analytical skills in working with sounds, and adaptability of the methodology to different age groups. However, these methods have several drawbacks. These include theoretical complexity for beginners, the abstract nature of transcription symbols, which can lead to additional difficulties, a lack of practical application in real-life communication, often a dull and monotonous perception of exercises, and a lack of connection to the communicative context.

Another traditional method of developing phonetic skills is through listening and working with authentic materials. The advantages of using this method are developing the ability to perceive different accents and dialects, learning the context of intonation and rhythm of speech, immersion in a real language environment, and increasing motivation through communication with a living language. The disadvantages are difficulty for beginners, lack of individual feedback, passive perception without active practice, insufficient systematization of phonetic phenomena, and potential difficulties in selecting materials of the appropriate difficulty level.

Traditional methods like drama and phonetic games have several benefits, including boosting motivation and interest in learning, lowering psychological barriers and the fear of making mistakes, developing skills in real-life communication, activating various channels of information perception, and fostering a positive emotional environment in the classroom. Some drawbacks include the difficulty of planning formal training, the time needed for preparation and delivery, the possibility that students will view training as amusement rather than education, the absence of systematic phonics practice, and the unequal involvement of all students in the process.

Creative approaches to improving phonetic skills have become popular in the digital era. Mobile apps using speech recognition offer several benefits, including instant feedback on pronunciation, unlimited practice opportunities, gamification processes that boost motivation, and accessibility to diverse user populations. However, drawbacks include inadequate speech recognition technologies, potential for system misinterpretation of speech, absence of comprehensive intonation assessment methods, dependence on specialized equipment and internet connectivity, and limited feedback providing a technical evaluation.

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Another cutting-edge technique is speech visualization technologies. They provide an objective evaluation of pronunciation quality, a visual depiction of the acoustic properties of sounds, the opportunity to compare one's pronunciation with a reference, the development of a mindful approach to articulation, and efficacy for kinesthetics and visuals. The drawbacks include the high expense, the challenge of interpreting spectrograms without specialized training, the technical difficulty of using it for specific student categories, the requirement for specialized teacher knowledge, and the focus on the technical aspect of pronunciation without a communicative context.

Virtual and augmented reality provide benefits like reducing psychological barriers through interaction with virtual characters, simulating various communication contexts, integrating phonetic skills into communication situations, creating an immersive language environment, and high levels of motivation and engagement. The drawbacks are the high price of both software and hardware, their restricted mass-use availability, the accuracy of pronunciation recognition technology, and the challenge of incorporating them into the conventional educational process.

AI platforms offer numerous advantages: comprehensive learning progress analysis, automatic task complexity adjustment, error recognition with personalized recommendations, adaptation to individual student characteristics, and continuously improving algorithms (Chen et al., 2024; Zhang et al., 2024). Drawbacks include high development costs, lack of human interaction, ethical concerns regarding personal data collection, dependence on initial programming quality, and limited adaptability in unusual situations.

Combining traditional and modern approaches optimally develops phonics skills. Benefits include diverse methodologies, sustained student engagement, compensation for individual approach limitations, a balance between technological and human elements, and adaptability to various learning environments. Drawbacks encompass complex planning requirements, the need for highly qualified teachers, the risk of learning fragmentation, technical implementation challenges, and additional preparation time.

Blended learning provides process flexibility, combines individual and group work, enables effective classroom time utilization, develops self-regulation skills, and allows personalized learning pace. Disadvantages include requiring high student motivation, managing independent work complexity, the risk of inadequate material processing outside class, increased teacher workload, and student technological difficulties. When choosing the best methods to enhance phonetic skills, there are a number of crucial recommendations to take into account. Priority one should be given to the age and personal characteristics of the students. For instance, younger learners benefit more from game-

based and imitation-based approaches, adults benefit more from analytical transcribing techniques, visual learners benefit from speech visualization systems, and kinesthetic learners benefit from actual articulation exercises. Second, techniques should be tailored to language proficiency: more structured exercises and teacher supervision are needed for beginners, more real-world materials can be used for intermediate and advanced levels, and once basic skills are established, technology solutions can be used more effectively. Third, it is critical to balance group and individual projects. For instance, teachers can arrange individual consultations to address particular issues, use group work to strengthen phonics' communication components and mix solo practice with technological alternatives. Fourth, students should practice phonics regularly and methodically. Practice is more crucial than intensity; phonetic elements should be introduced gradually, progressing from simple to complicated, and repeatedly revisited for reinforcement.

Thus, we consider that the best method to improve English phonetic skills is to combine the components of traditional (classical) approaches with contemporary technologies. Modern technologies guarantee personalized learning, offer consistent and demanding practice, and boost motivation. Traditional approaches offer consistency and a thorough comprehension of phonetic peculiarities. Teachers should always take into account the age of learners, level of their language acquisition, learning style, technical abilities, learning goals, and accessible resources while choosing and offering a teaching strategy. It is crucial to remember that even the most advanced technology cannot wholly replace in-person collaboration and informed instruction from a skilled instructor. In order to improve students' phonetic skills harmoniously and incorporate them into their general communication skills, the optimal strategy uses a range of techniques and technology.

In order to study the effectiveness of augmented reality (AR) technologies in the development of phonetic skills, a comprehensive survey and questionnaire was conducted among teachers and students in two Ukrainian higher education institutions – Berdiansk State Pedagogical University and Municipal Institution “Kharkiv Humanitarian Pedagogical Academy” of Kharkiv City Council, involving 4 teachers and 18 students who used augmented reality (AR) applications for English phonetics learning. For the experiment, students were offered to use the following applications in their English phonetics classes in order to improve and refine their phonetic skills:

**Mondly AR** – offers AR functionality and a virtual teacher to help students learn to speak. The app evaluates and corrects the user's speech in real time using speech recognition technology.

**Lingokids AR** – designed for children, its AR features are helpful in learning phonics, such as

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interactive flashcards with pronunciation and visualization of sounds.

**ELSA Speak** uses artificial intelligence to provide personalized English pronunciation training by analyzing their speech and providing instant feedback on the pronunciation of each word and sound. The app highlights problematic sounds and details the correct jaw, tongue, and lip position to improve pronunciation.

**Speechling** allows students to record their speech and compare it with that of native speakers, as well as receive personal feedback from real teachers who review their recordings, with communication focusing on interactive learning through imitation.

**Fluent.ai** adapts to students' unique speaking styles and accents using voice recognition technology that works without an internet connection. This allows learners to work efficiently in noisy environments without an internet connection.

**Phonetics Focus** – a specialized tool for learning the phonetic system of a language, offering phonetic transcription, detailed visualizations of sound articulation, and exercises to help students understand and practice the finer nuances of pronunciation, such as stress, rhythm, and intonation.

**ARTranslate** – although a translator, it has features for learning and practicing pronunciation with virtual reality elements demonstrating articulation.

Most apps we have chosen to help students improve their English pronunciation skills come with a basic free version with the option to upgrade their functionality via a subscription. They are available for iOS and Android, although the functionality may vary depending on the device, and their work is intuitive. They can be used both during classes (visualization) and as an interesting addition to homework.

According to a survey of teachers, 75 % of respondents noted that using AR technologies has significantly boosted the process of forming correct pronunciation in students. 75 % of teachers said that such technologies are particularly effective in working with students who have difficulty with traditional methods of teaching phonetics. In addition, 100 % of teachers surveyed said that AR applications help visualize articulation processes that cannot be demonstrated in other ways.

Students also noted the benefits of using AR technologies in their responses. 85 % of respondents agreed with the statement that AR applications make the process of learning phonetics more understandable and interesting. 79 % of students said that augmented reality technologies helped them better understand the difference between similar sounds in English that are not present in Ukrainian. In addition, 91 % of respondents noted that instant feedback provided by AR apps significantly speeds up the process of pronunciation correction.

An interesting aspect of the study was that students with different levels of English language proficiency

assessed the benefits of AR technologies differently. For example, among students at the beginner level (A1-A2), 94 % noted the high efficiency of these technologies, while among students at the B1-B2 level, the number was 72 %. This may indicate that AR technologies are beneficial in the initial stages of phonetic skills development. There was also a correlation between the age of students and their assessment of AR technologies: younger students (17–19 years old) rated them significantly higher than older students (20–21 years old). This may be because the younger generation is generally more accustomed to using technology daily.

A detailed analysis of the results of this study also revealed that all 18 students made significant progress in pronouncing problematic sounds after a course of AR-based lessons. Awe-inspiring results were obtained in the correction of the following errors typical of Ukrainian students:

1. Deafening of final voiced consonants (e.g., pronunciation of [d] as [t] at the end of words) – complete correction in 14 out of 18 students;
2. Absence of aspiration in the sounds [p], [t], [k] – significant improvement in all 18 students;
3. Replacement of interdental [θ] and [ð] with [s], [z] or [t], [d] – complete correction in 13 out of 18 students;
4. Incorrect pronunciation of the sound [w] – complete correction in all students;
5. Indistinguishability of the sounds [æ] and [e] – significant improvement in 12 out of 18 students.

One of the phonetics teachers who taught classes using AR technologies, Associate Professor I. Shkola, said: “The system proved extremely effective for students who could not overcome typical phonetic difficulties. The ability to hear and see was a real breakthrough for them. It is especially valuable that students have learned to be aware of the work of their articulation organs and can control their pronunciation on their own”. The students who participated in the study also praised the effectiveness of such technologies. According to one of the participants, B. Maria: “I have been learning English for 10 years, but I have never been able to pronounce the [θ] and [ð] sounds correctly. Numerous explanations from teachers did not help, but when I felt how the tongue should work with AR technologies, everything fell into place in just a few lessons”. This methodology demonstrates that the combination of visual, auditory, and kinesthetic channels of perception through AR technologies can be a powerful tool for correcting persistent phonetic errors in students with different proficiency levels.

These results show that phonetic skills acquired through embodied learning methods are significantly more stable in the long term than traditional ones. The teachers who participated in the study explain that because embodied learning affects kinesthetic and

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auditory sensations, it creates deeper neural connections. This creates a multi-level system of neural connections that is better for long-term memorization. The study was fascinating when students in the experimental group retained their phonetic skills better and demonstrated better pronunciation and self-correction skills.

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“Корінь навчання гіркий, зате плоди його солодкі”.

Аристотель  
давньогрецький філософ

“Найбільша розкіш на землі – це розкіш людського спілкування. І справжнє навчання відбувається саме у спілкуванні”.

Антуан де Сент-Екзюпері  
французький письменник

