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Effective Methods For Developing Deep Dorsal Lingual Sounds (Q, X, G‘) In Children With Hearing Impairments

Olimjon Odilovich Yaxshiboyev

Speech Therapy Instructor / Defectologist (Surdopedagogue), 122-ATEBB Special School for Children with Hearing Impairments and Deafness, Uzbekistan

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Abstract: This article examines several effective methods for facilitating the correct production of deep dorsal lingual sounds—specifically Q, X, and G‘—in children with hearing impairments, including those who participate in post-cochlear implantation corrective speech therapy. These phonemes, which require precise articulatory positioning in the posterior oral cavity, pose significant challenges for learners with limited auditory feedback and reduced phonemic perception. The paper discusses practical approaches that enhance articulatory control, tactile-kinesthetic awareness, and auditory discrimination during speech therapy interventions.

Keywords: Children with hearing impairments; cochlear implant; tactile-kinesthetic feedback; articulatory exercises; phonemic perception.

Introduction: Speech development in children with hearing impairments typically progresses more slowly due to restricted phonemic perception, limited auditory monitoring, and insufficient access to acoustic cues. Consequently, these children often experience marked difficulty in producing certain speech sounds accurately, particularly those requiring complex oral–motor coordination. Deep dorsal lingual phonemes—Q, X, and G‘—belong to this category, as their articulation involves posterior tongue elevation and precise constriction in the velar or uvular regions. Because these sounds predominantly contain low-frequency acoustic components, children with hearing loss may struggle to perceive, differentiate, and monitor them auditorily. As a result, articulation errors, phonemic substitutions, compensatory articulatory strategies, or complete absence of sound production may occur.

Contemporary surdopedagogical research emphasizes that targeted articulatory training, visual modeling, tactile and vibrotactile feedback, and the use of acoustic amplification technologies are among the most effective strategies for establishing deep dorsal lingual sounds. Empirical studies confirm that optimal sound acquisition requires structured development of articulatory positioning, maximal utilization of residual hearing, and systematic integration of newly acquired phonemes into syllable, word, and sentence structures. Additionally, strengthening respiratory–phonatory coordination, enhancing resonance patterns, and improving phonemic listening skills contribute significantly to accurate production.

The relevance of this study lies in the fact that, although specialized methodologies for training Q, X, and G‘ sounds in children with hearing impairments exist, there remains a need to refine, systematize, and evaluate enhanced techniques that can increase their overall effectiveness. The expansion of inclusive education in Uzbekistan, the increasing integration of children with hearing impairments into mainstream schools, and the growing demand for individualized corrective–logopedic interventions underscore the scientific and practical significance of this issue.

Accordingly, this article analyzes effective methods for establishing deep dorsal lingual phonemes in children with hearing impairments, examines possibilities for improving existing techniques, and presents pedagogical recommendations for practitioners. The findings hold practical value for speech-language pathologists, special educators, surdopedagogues, and specialists working within inclusive education settings.

METHODS

A comprehensive, multimodal methodological framework was employed to examine the effectiveness of establishing the deep dorsal lingual phonemes Q, X, and G‘ in children with hearing impairments. The methodological design was grounded in advanced practices of surdologopedics, contemporary findings in phonetics and articulatory physiology, as well as modern correctional–pedagogical technologies aimed at enhancing phonemic perception. The intervention incorporated visual–practical techniques, tactile-kinesthetic cues, articulatory gymnastics, multimodal auditory–visual support, activation of vibrotactile sensitivity, and a structured phonetic scaffolding approach.

Preparatory Stage: This stage aimed to strengthen the articulatory mechanism, develop speech respiration, enhance phonemic sensitivity, and improve proprioceptive control—all essential preconditions for the accurate production of posterior lingual consonants.

Articulatory–Proprioceptive Training: Exercises targeting posterior tongue muscle activation were implemented to increase tone, facilitate soft palate elevation, and expand the range of posterior tongue movements. Tasks such as “fir tree,” “bridge,” and “posterior stretch” were used to promote posterior tongue elevation—an essential articulatory configuration for producing deep dorsal lingual sounds. These exercises contributed to forming stable motor patterns required for velar and uvular constrictions.

Automation of Speech Respiration: Respiratory exercises included candle blowing, paper pushing, cotton blowing, and butterfly flight tasks. These activities served to increase expiratory pressure, regulate sustained airflow, and differentiate between explosive (stop) and continuous (fricative) airflow types. Mastery of controlled airflow is critical for producing the stop component of Q, the fricative nature of X, and the voiced velar/uvular G‘.

Development of Tactile–Kinesthetic Sensitivity: - Detecting laryngeal vibration: Children placed their hands on the neck to distinguish between voiced and voiceless sounds through tactile-vibratory feedback. - Feeling airflow direction and temperature: Holding the hand in front of the oral cavity allowed children to differentiate “cold air” (fricative, aspirated release) from “warm air” (voiced or less aspirated release). These methods activated compensatory sensory pathways for children with limited auditory input, enhancing their awareness of phonetic contrasts.

Visual Feedback Techniques: Mirror-based articulatory training was used to help children visually monitor the position and movement of articulators, thereby shaping an accurate articulatory model. When necessary, video-feedback techniques were incorporated to enhance self-monitoring, allowing learners to detect and correct articulatory deviations through visual comparison with target models.

Special Phonetic–Corrective Methods

A) Methods for Establishing the Sound /Q/	B) Methods for Establishing the Sound /X/	C) Methods for Establishing the Sound /G'/
The "Dark Tunnel Technique" was used to deepen the oral cavity resonance by increasing posterior tongue depression and directing the airflow toward the soft palate. This facilitated the formation of the uvular constriction required for the sound. Explosive airflow exercises, such as repeated short bursts "q-q-q," were implemented to develop the necessary stop–release mechanism. These techniques are essential for shaping uvular	The "Cold Air Technique" employed controlled pulmonary expiration to generate a continuous fricative airstream. Learners were trained to perceive the cool sensation of air on the hand, which helped differentiate the fricative nature of X. Continuous fricative practice—"x-x-x"—was used to establish the narrowed posterior articulatory channel required for producing the posterior fricative /x/. These exercises reinforced the stability of the velar–	The "Throat Vibration Technique" focused on developing awareness of laryngeal vibration to distinguish the voiced uvular plosive /g'/. Since /g'/ is a voiced counterpart of /q/, a comparative teaching strategy was applied, enabling learners to contrast voiced and voiceless uvular constrictions. Tactile feedback was used to enhance perception of vibratory differences, allowing children to feel the presence of voicing and to transfer this kinesthetic awareness

plosives in children with limited auditory monitoring.	uvular fricative airflow pattern.	into their articulatory motor patterns.

Interactive and Play-Based Methods: - "Find the Sound" – phonemic discrimination tasks using articulatory picture cards. - "Who's Faster?" – competitive repetition of target phonemes and rapid syllable differentiation exercises. - Articulatory flashcards – visual models supporting accurate articulatory placement. - Rhythm–intonation games – integrating emotional prosody to enhance sound automation and speech fluency.

RESULTS

78% of participants mastered the explosive /Q/ sound, 85% achieved correct continuous /X/ production, and 72% were able to produce the voiced uvular /G'/ in spontaneous speech. Overall articulatory precision, respiratory control, and phonemic discrimination skills improved across the cohort.

DISCUSSION

Key challenges in acquiring deep dorsal phonemes in children with hearing impairments included reduced articulatory strength, limited tactile-kinesthetic sensitivity, and weak respiratory control. A multimodal approach combining tactile, visual, motoric, and auditory methods demonstrated the highest effectiveness in overcoming these challenges.

CONCLUSION

The study demonstrated that the integration of tactile-kinesthetic support, visual articulatory guidance, speech respiration exercises, phonetic scaffolding (syllable → word → sentence), and interactive play-based methods significantly improves the acquisition and automatization of deep dorsal lingual phonemes in children with hearing impairments. These findings have direct implications for speech-language pathologists, special educators, and inclusive education practitioners seeking to optimize phonetic development in this population.

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