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ENGAGEMENT AND ACCEPTABILITY OF GAMIFIED DIGITAL SPEECH PRACTICE AMONG PRESCHOOL CHILDREN WITH SPEECH SOUND DISORDERS

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Introduction. Successful correction of speech sound disorders in preschool children depends not only on the technical accuracy of a therapeutic method but also on the child's willingness to participate in repetitive articulation exercises. Children aged 4–6 years often require frequent and systematic practice to establish a stable articulatory pattern. However, conventional drill-based speech exercises may become monotonous, which can limit sustained attention and reduce active participation.

Digital technologies provide an opportunity to combine therapeutic practice with elements of play, immediate feedback and visual reinforcement. In particular, gamified mobile environments may transform repetitive articulation exercises into an interactive activity. Such an approach is potentially valuable in preschool children, because motivation and active participation directly influence the amount and consistency of practice.

The "Ovozim" application was designed with several child-centered components. The animated "Bulbulcha" character demonstrated tongue, lip and airflow positioning; the application analyzed speech in real time and provided visual and auditory feedback; and the "Bulbul bog'i" game environment rewarded correct pronunciation through animated flowers and bird sounds.

Although technological speech interventions are frequently evaluated primarily according to articulation outcomes, their practical implementation also depends on whether children enjoy using them and whether parents and educators perceive them as understandable, useful and suitable for routine practice.

Aim

To assess engagement, usability and stakeholder acceptance of a gamified speech-recognition-supported training approach in Uzbek-speaking preschool children with sigmatism and to determine whether high engagement was accompanied by measurable improvement in speech performance.

Materials and Methods

The study included 50 Uzbek-speaking preschool children aged 4–6 years with clinically confirmed sigmatism from two public preschool institutions in Tashkent. The mean age of the participants was 5.1±0.6 years. All children had normal hearing and no reported neurological or developmental disorders. Participants were divided into an experimental group (n=25) and a control group (n=25).

The experimental group participated in supervised sessions using the “Ovozim” application for 15 minutes per day, five days per week, for eight weeks. Training focused on six target sounds: /s/, /z/, /sh/, /j/, /ch/ and /ts/. The control group continued standard preschool language activities of comparable daily duration, including poetry recitation, singing and repeated word exercises.

Speech performance was measured before and after the intervention using the standardized Sigmatism Assessment Test. Recordings were independently evaluated by two certified Uzbek-speaking speech-language specialists blinded to group allocation. Inter-rater agreement was high, with a Cohen’s kappa coefficient of $\kappa=0.92$.

To evaluate the practical acceptability of the intervention, parents and educators of children in the experimental group completed a questionnaire based on a five-point Likert scale, where 1 represented complete disagreement and 5 represented complete agreement. The questionnaire assessed child interest, attention to speech, perceived improvement in speech clarity, ease of use and willingness to continue using the tool in group-based activities.

Results

Stakeholder feedback demonstrated a high level of child engagement with the gamified intervention. Ninety percent of parents reported that their child voluntarily requested to use the application outside the scheduled training period. Educators reported an approximately 30% increase in active participation in language-focused activities among children in the experimental group.

The questionnaire results further demonstrated favorable perceptions of the digital intervention. The statement *"The child showed interest and enjoyment while using the application"* received a mean score of 4.6 out of 5, representing the highest-rated item. Parents and educators also reported that children became more attentive to their own speech, with a mean score of 4.3. Perceived improvement in speech clarity received a mean score of 4.2. The usability of the application interface for young children was rated 4.4, while willingness to continue using the tool in group activities received a mean score of 4.5.

Importantly, the high engagement was accompanied by measurable improvement in articulation performance. The experimental group improved from a baseline articulation accuracy of 47.8±9.6% to 78.4±7.2% after the intervention, corresponding to an absolute gain of 30.6 percentage points and a relative improvement of 64.0%.

The control group improved from 47.1±10.1% to 57.6±9.0%, an absolute gain of 10.5 percentage points and a relative improvement of 22.3%. Post-intervention differences significantly favored the experimental group ($t(48)=9.47$, $p<0.001$), while mixed-design ANOVA demonstrated a significant group-by-time interaction ($F(1,48)=52.18$, $p<0.001$).

These findings indicate that the intervention was not only well accepted by children and adults but was also associated with substantially greater improvement in speech accuracy than conventional preschool language activities.

Discussion

The present findings suggest that engagement is an important component of technology-supported speech intervention in preschool children. The high proportion of children who voluntarily requested additional use of the application indicates that the intervention was perceived as an enjoyable activity rather than solely as a therapeutic task.

Several features may have contributed to this response. Immediate visual and auditory feedback allowed the child to receive a rapid response after each articulation attempt. At the same time, animated rewards provided reinforcement for correct production. The use of an animated character demonstrating articulatory positioning may also have made otherwise abstract speech-motor instructions easier for young children to understand.

The questionnaire findings support this interpretation. The highest score was related to interest and enjoyment, while usability and willingness to continue using the system also received high ratings. This suggests that the application was perceived as developmentally appropriate for the target age group.

The parallel improvement in articulation performance is clinically relevant. High engagement alone would have limited value if it were not accompanied by improved speech production. In this study, however, the experimental group achieved a substantially greater improvement in articulation accuracy than the control group. Therefore, gamification appears to function not merely as an entertainment component, but as a mechanism that may help maintain repeated and focused practice.

At the same time, these findings should be interpreted within the limitations of the study. Participants were recruited from only two public preschool institutions in Tashkent, and the intervention period was limited to eight weeks. The original study also notes that long-term retention of the achieved improvements was not evaluated.

Conclusion



Gamified digital speech practice was associated with a high level of engagement and favorable acceptance among Uzbek-speaking preschool children, their parents and educators. Ninety percent of parents reported voluntary requests for additional application use, while educators observed increased participation in language activities. Ratings for enjoyment, usability and continued use ranged from 4.2 to 4.6 out of 5.

The high acceptability of the intervention was accompanied by a marked improvement in articulation accuracy, which increased from 47.8% to 78.4% in the experimental group. These findings indicate that child-centered gamification, immediate feedback and developmentally appropriate interface design may represent important components of digital speech intervention in preschool settings. Future studies should assess whether this high level of engagement can be maintained during longer treatment periods and whether it contributes to long-term retention of corrected speech patterns.