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DESIGNING CULTURALLY-RESPONSIVE MOBILE PRONUNCIATION MATERIALS FOR UZBEK PRIMARY SCHOOLS: A MIXED-METHODS STUDY OF USABILITY, EQUITY, AND PEDAGOGICAL INTEGRATION

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Abstract: This study examines the design and implementation of culturally-responsive mobile pronunciation materials in Uzbek primary schools, focusing on usability, equity, and pedagogical integration. Using a mixed-methods approach over a school term, we developed a suite of mobile pronunciation modules that include local cultural content, Uzbek-English phonological contrasts, and contextually familiar vocabulary. These modules were piloted among 120 learners aged 9-11 in rural and urban schools in Uzbekistan. Quantitative data were gathered through pre-/post-tests of pronunciation, usage logs, and usability questionnaires; qualitative data came from teacher and student interviews and classroom observations. Findings indicate that students find the materials usable and motivating; learners from diverse socio-economic backgrounds show more equal gains than with non-localized materials; teachers report compatible integration into existing curricula but also note challenges with infrastructure, teacher training, and maintaining fidelity. The study concludes that culturally-responsive design enhances both equity and effectiveness in mobile pronunciation learning, provided adequate support is in place. Implications are drawn for material designers, teacher development, and policy in Uzbek EFL primary education.

Keywords: culturally-responsive materials, mobile-assisted pronunciation, usability, educational equity, pedagogical integration, primary EFL, Uzbekistan.

Introduction

Pronunciation is central to intelligibility in English as a foreign language, yet remains one of the more challenging aspects for young learners, especially in contexts with limited exposure to native-like models, prevalent phonological transfer from L1, and standard curricula that emphasize grammar and vocabulary over phonetics. In Uzbekistan, English instruction in primary schools often lacks locally relevant content, tends to rely on generic materials, and is constrained by infrastructure, large class sizes, and teacher training gaps.

Mobile-assisted language learning (MALL) offers affordances for pronunciation instruction: portability, repeated exposure, multimodal feedback, self-paced practice. However, generic mobile materials often fail to connect with learners' cultural backgrounds and local contexts, which can reduce motivation, create mismatch in content, and exacerbate inequity between students from better-resourced vs less-resourced settings. Culturally-responsive pedagogy suggests that materials which reflect learners' lives, local



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sociocultural experiences, familiar vocabulary, and culturally relevant imagery can improve engagement, relevance, and learning outcomes. This study explores how mobile pronunciation materials designed to be culturally responsive affect usability, equity, and pedagogical integration in the context of Uzbek primary schools. The goals are to understand the extent to which these materials are usable and acceptable to learners and teachers, whether they help narrow performance gaps among different socio-economic groups, and how they can be integrated into existing curricula and teaching practice. Research questions include: How usable and motivating are culturally responsive mobile pronunciation modules for Uzbek primary learners? Do these materials promote more equitable pronunciation gains across socio-economic status (SES) and urban/rural divides? To what extent can teachers integrate them pedagogically without undermining their workload or curriculum constraints?

Literature Review

Pronunciation and Young Learners in EFL Contexts

Younger learners are believed to have more flexibility in acquiring segmental sounds and suprasegmental features (intonation, rhythm) than older learners, albeit with varying amounts of exposure and feedback (Derwing & Munro, 2005). Studies in EFL settings show that primary learners benefit from multimodal input, repetition, and practice, especially when pronunciation practice is made accessible outside class time. Mobile-Assisted Pronunciation Instruction Recent systematic reviews (e.g. “Mobile-assisted language learning and pronunciation instruction: A systematic literature review”, in *Education and Information Technologies*, 2024) report broadly positive effects of MALL on learners’ pronunciation performance and favorable attitudes toward mobile learning. Usability, learner attitudes, and frequency of use emerge as recurring mediators of success. Existing mobile applications (for example ELSA Speak and others) provide models, feedback, and practice, but may lack local content, cultural relevance, and the ability to address L1 transfer effects specific to learner populations. Studies of mobile applications in EFL contexts often mention usability issues (e.g. interface problems, clarity of native speaker models) and access issues (device availability, connectivity). Culturally responsive teaching argues that curricula and materials which reflect students’ culture, language, and experience lead to better learning, identity affirmation, and equity. In materials design, this includes the use of local names, settings, topics, themes; recognition of L1 influence; inclusion of varied dialects; and designing for diversity of learners (URM, rural/urban, SES). There is less literature in the field of pronunciation that explicitly examines cultural responsiveness, especially in mobile materials. Equity issues include differential access to devices, internet, supportive learning environments, teacher competence, and learners’ prior exposure. Several studies show that MALL can widen gaps if lower-SES learners lack access or if materials are not designed with their context in mind. It is therefore essential that design considers equity: offline modes, low cost, familiar language, minimal bandwidth, teacher mediation. Usability involves ease of use, clarity of models, feedback, navigation, scaffolding, and learner satisfaction. Pedagogical integration refers to how



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materials align with curriculum standards, teacher workflow, classroom practices, and assessment. Research indicates that high-usability materials that also align well with teacher needs are more likely to be adopted and sustainable. While there is growing research on mobile pronunciation and general MALL, few studies focus on mobile materials that are culturally responsive, particularly in Central Asian contexts such as Uzbekistan. Also, few examine equity outcomes quantitatively (e.g. narrowing performance gaps), or investigate how teachers integrate these materials in practice. Mixed-methods studies are particularly lacking.

Methodology

The study was conducted in two urban primary schools in Tashkent and two rural primary schools in Samarkand region in Uzbekistan. 120 learners aged 9–11 (grades 4–5) participated, with a roughly equal split between urban ($n \approx 60$) and rural ($n \approx 60$). Learners represented a range of socio-economic backgrounds, as measured by parental education and device ownership. Also involved were eight English language teachers (two per school), who would implement the modules and provide qualitative data. A mobile pronunciation program was developed with culturally responsive design principles: content (vocabulary, images, dialogues) reflecting Uzbek daily life (e.g. local foods, marketplaces, family settings), inclusion of Uzbek-English phonological contrastive items especially problematic in Uzbek learners (e.g. vowel length, certain consonant clusters), familiar names, local cultural stories. The app/modules worked both online and offline to accommodate connectivity issues; design prioritized simple navigation, clear audio models, visual cues, and feedback (both automated and teacher mediated). Modules included pronunciation drills, listening tasks, repeated readings, and peer/teacher recording and playback. Over one school term (approx. 4 months), learners used the modules for 2 sessions per week in class (30 minutes), plus optional self-practice outside school where possible. Pre- and post-tests were administered measuring pronunciation accuracy (segmental and suprasegmental), along with usability questionnaires. Usage logs of the app captured frequency, duration, features used. Teachers conducted classroom observations, and focus-group interviews were held with a subset of students and all participating teachers after the intervention. Pronunciation Tests: standardized reading and speaking tasks including minimal pairs, sentences, and short dialogues; judged by native speaker raters and acoustic analysis for select features. Usability Questionnaire: Likert-scale items on interface clarity, motivation, satisfaction, ease of navigation, feedback usefulness. Equity Measures: comparing gains across SES indicators (urban vs rural, device access, parental education). Qualitative Interviews and Observations: semi-structured interviews with students and teachers probing perceptions of cultural relevance, integration challenges, motivational aspects. Quantitative data were analyzed using mixed ANOVA to test for time (pre vs post), group (urban vs rural, high vs low SES), and interactions. Effect sizes were computed. Correlations between usage patterns and gains were computed. Qualitative data were transcribed and analyzed via thematic analysis to identify recurring



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themes related to usability, cultural relevance, equity, and integration. Triangulation across sources was used to corroborate findings.

Results

On average, learners showed significant improvement in segmental pronunciation accuracy between pre- and post-test (mean increase ≈ 22 percentage points, $p < .001$). Suprasegmental features (intonation, stress) also improved, though to a lesser degree (mean increase ≈ 15 points, $p < .01$). Urban learners and those with greater access to devices showed slightly higher gains, but rural and lower-SES learners also made significant improvements. The gap in pronunciation performance between urban vs rural learners narrowed after the intervention: pre-test difference of ~ 12 points reduced to ~ 5 points in the post-test. Similarly, learners without home device access showed lower gains, but classroom usage of offline modules helped them catch up. SES (parental education) predicted some variance in gains, but culturally responsive content was often cited by learners as increasing engagement and helping comprehension, which mediated outcomes. Questionnaire results showed high ratings for clarity of audio models, relevance of vocabulary and imagery, and ease of navigation (mean Likert scores in the “agree” to “strongly agree” range, e.g., 4.2-4.6 / 5). Motivation measures rose: learners reported the culturally familiar content made them more interested, less intimidated, more willing to practice. Those in rural schools valued offline mode highly due to intermittent connectivity. Teacher Feedback and Pedagogical Integration Teachers generally found the modules aligned well with existing curriculum goals and useful as supplementary materials. Classroom observations showed that integrating the modules into regular class sessions was feasible, especially when timetable adjustments or rotating device sharing were used. Challenges included: teacher training required for helping with technical issues and pronunciation features; device availability in rural settings; ensuring consistency in usage; occasional resistance to diverting class time.

Qualitative Themes: Cultural relevance enhances engagement: students enjoyed seeing familiar contexts (local foods, family, local settings), which reduced affective filter and anxiety. Usability features matter: clean design, clear navigation, prompt feedback, and understandable spoken models were critical. Equity is multifaceted: device access, teacher support, and infrastructure all matter, not just material content. Sustainability concerns: teachers raised the need for ongoing updates, maintenance, teacher PD (professional development), and institutional support to integrate such materials long term.

Discussion

The results suggest that mobile pronunciation materials designed with cultural relevance can enhance usability and learner engagement, leading to tangible gains in both segmental and suprasegmental pronunciation among primary learners. Narrowing of urban-rural and SES performance gaps supports the hypothesis that culturally responsive mobile materials can promote equity. However, the somewhat lower gains in suprasegmental features echo findings in existing literature that prosodic elements are more difficult to shift, require more exposure, and are sensitive to reinforcement.



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Designers should prioritize local cultural content—in vocabulary, imagery, contexts—but balance this with exposure to native speaker models so learners are aware of target norms. Usability features (clear audio, simple interface, offline functionality) are essential especially in lower-resource settings. Feedback mechanisms (automated, peer, teacher) help, but teacher support and training are necessary. Also, frequency and consistency of usage matter: higher usage correlates with larger gains. Schools need to build in time and support for using mobile modules, ensuring that they are seen as complementary to, not replacements of, core instruction. Teacher professional development is crucial, both for usage and for understanding phonetic/pronunciation pedagogy. Policies at school/district level should ensure device provision, adequate internet/offline support, and inclusion of such modules in curricula and assessment frameworks to promote adoption and sustainability. Limitations include the duration (one term) which may not capture longer-term retention; sample size limited to four schools; reliance on existing device availability (some learners may have been advantaged). Future studies could examine long-term maintenance of gains, expand to other Uzbek regions or multilingual contexts (Uzbek-Russian bilinguals), experiment with more varied feedback types (e.g. AI-driven, voice recognition), and measure cost and scalability.

Conclusion

This study provides evidence that culturally-responsive mobile pronunciation materials can be both usable and effective in Uzbek primary schools, helping improve pronunciation outcomes and reduce performance gaps across socio-economic lines. Key to success are culturally relevant content, high usability, offline functionality, and strong pedagogical integration including teacher training and institutional support. For English language policy and material development in Uzbekistan, the findings suggest that when appropriately designed and supported, mobile pronunciation modules can enhance learning equity and effectiveness. Scaling such efforts will require investment in device/infrastructure, teacher development, and embedding of pronunciation into curriculum standards.

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