



Digital Technology-Enabled Reform of Continuing Education for Students with Visual Impairments: A Case Study of the College of Continuing Education, Beijing Union University

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Abstract

Digitalization has become an inevitable trend for the high-quality development of degree-oriented continuing education. Ensuring equal access for blind learners is essential to advancing educational equity and inclusive education. Most visually impaired adult learners in China are employed in the massage industry and rely primarily on mobile phones rather than computers. However, mainstream online learning platforms generally lack accessibility features, present highly visualized course materials, and separate learning and assessment systems. This study adopts a mobile-first strategy and constructs an accessible teaching model optimized for Android TalkBack and iOS VoiceOver. A full set of auditory-based courses was developed, and assessment functions were integrated into the same mobile platform. Using action research and pre-post comparative methods, a reform pilot was conducted with visually impaired learners majoring in Acupuncture and Tuina. Results show significant improvements in learning experience, academic performance, and autonomous study time. The study provides a scalable model for promoting digital inclusion in continuing education.

Keywords

Students with visual impairments; Degree-oriented continuing education; Accessibility; Mobile learning; Screen-reading technology

1. Introduction

Against the backdrop of education digitalization and lifelong learning, adult continuing education has entered full digital transformation. For visually impaired learners, higher education is essential for improving professional skills, social participation, and educational equity.

Domestic studies have explored digital transformation for visually impaired students. Lu (2025) identified challenges such as cognitive bias and resource misalignment. Zhou (2025) focused on multimodal resources and interactive platforms. Cai (2024) stressed barrier-free access to online learning. Li (2025) emphasized the right to information accessibility. Shen (2025) pointed out limitations in traditional teaching for Tuina majors, while Ma (2023) studied intelligent technology applications. However, systematic research on employed adult visually impaired learners, mobile-first design, lightweight platform adaptation, and integrated learning-assessment systems remains

insufficient.

Most adult visually impaired students are Tuina practitioners who rely on mobile phones and screen-reading tools but lack PC access. Mainstream commercial platforms are poorly accessible, causing barriers to independent learning. This study constructs a mobile-first accessible model based on the Superstarlearn (Xuexitong) APP, optimizes screen-reading adaptation, develops pure auditory courses, and integrates assessment. It aims to form a replicable digital teaching scheme to support equitable continuing education for special groups.

2. Research Basis and Problem Formulation

2.1 Research Participants

This study selected 289 students with visual impairments majoring in Acupuncture and Tuina (undergraduate and associate degree) from the 2022-2024 cohorts at the School of Continuing Education, Beijing Union University. All participants were legally blind or low-vision learners, mainly employed in social massage and tuina institutions. They had independent living skills and mobile phone operation abilities, used Android TalkBack or iOS VoiceOver daily, and most lacked access to PCs and computer operation skills. Their learning was highly dependent on mobile terminals and characterized by fragmented learning time.

2.2 Group Characteristics and Practical Dilemmas

Adult students with visual impairments in academic continuing education show obvious characteristics: employed, mobile-reliant, mobile-first, and without PC access. These characteristics determine that the traditional PC-dominated, offline-assisted teaching model can hardly meet their needs. Before the reform, the research team systematically identified four core obstacles through platform testing, student interviews, teacher discussions, and academic affairs reviews:

1) Severely insufficient accessibility adaptation on mobile platforms. The Superstarlearn (Xuexitong) APP had not been optimized for accessibility. Interface controls lacked ARIA labels, focus jumping was disordered, and voice prompts were missing. Android TalkBack and iOS VoiceOver could not accurately read or operate functions. Core processes such as course access, audio playback, assignment submission, exam participation, and score inquiry were difficult to complete independently, making learning highly dependent on assistance from others.

2) Highly visual course resources and a lack of an auditory system. Professional courses heavily use visual materials such as acupoint diagrams, anatomical charts, manipulation illustrations, and teaching videos. There was a lack of full-audio, understandable, and practical voice courses for students with visual impairments. Knowledge points were difficult to convey effectively through hearing, resulting in high learning difficulty and low comprehension efficiency.

3) Separation of learning and assessment systems, failing to form a learning closed loop. Online assessments relied on independent third-party platforms such as Tencent Questionnaire, which were not connected with Superstarlearn (Xuexitong). Data could not be shared, and no screen-reading adaptation was provided. Students had to switch between platforms, with cumbersome operations and poor stability. They could not take exams or check scores independently, leading to high psychological burden and operational costs.

4) Opaque academic information and difficulty in autonomous management. Academic information, such as grades, credits, schedules, and learning progress, was scattered across different modules without a unified, accessible inquiry entrance. Students with visual impairments could not independently check their academic progress, leading to unclear learning processes, unstable expectations, and reduced learning sustainability and sense of security.

2.3 Research Design and Methods

This study is an empirical investigation of teaching practice reform, using a one-group pretest-posttest quasi-experimental design. Independent variables included accessible platform transformation, voice course development, and learning-assessment integration. Dependent variables included students' learning experience, learning behavior, academic performance, and satisfaction. The effectiveness of reform measures was tested through paired data comparison before and after the reform. The main methods included action research, comparative research, technical testing, interviews, and content analysis.

3. Implementation of Teaching Reform

This study focused on the overall strategy of “mobile priority, PC assistance” and promoted three core tasks: platform accessibility transformation, voice course system construction, and learning-assessment integration migration.

3.1 Platform Accessibility Transformation: In-depth Mobile Adaptation and Moderate PC Compatibility

Platform transformation was the core technical part of this study. The team cooperated with Chaoxing technicians to focus on screen-reading accessibility on mobile phones and improve PC compatibility at the same time, realizing dual-end availability with mobile priority.

1) Core transformation on the mobile side to adapt to TalkBack and VoiceOver. For mobile transformation, firstly, accessibility labels and semantic reconstruction were carried out. Core interfaces of Superstarlearn (Xuexitong) APP, including the course page, playback page, exam page, score page, and notice page, were comprehensively optimized. Standard ARIA labels were added to buttons, lists, input boxes, and tabs to unify reading logic and focus order, ensuring that screen-reading software could accurately identify control names, statuses, and operation prompts. Secondly, the operation process was reconstructed to be extremely simplified. Page levels were greatly reduced; course learning, assignments, exams, scores, and notifications were set as fixed first-level entrances to reduce pop-ups and jumps. Gesture operation and keyboard focus were optimized to support full mouse-free operation. Thirdly, screen-reading was fully connected in the core modules. Functions such as audio playback, speed adjustment, assignment submission, question reading, auto-save, score inquiry, and credit statistics were fully accessible for screen-reading, with operable perception, status broadcast, and result confirmation. Fourthly, four rounds of intensive tests were conducted on both Android and iOS systems. Problems such as interrupted reading, disordered focus, out-of-focus buttons, and incomplete broadcast were fixed to achieve stable full-function operation.

2) PC auxiliary adaptation. Screen-reading compatibility optimization was performed on the web version, including control labels, page structure, and reading order, to meet the backup learning needs of a few students with PC access, but it was not used as the main learning path.

3.2 Construction of a Full-Auditory Voice Course System

According to the talent training program and syllabus of Acupuncture and Tuina, a total of 76 exclusive voice courses for students with visual impairments were systematically developed following the principles of full auditory, understandable, practical, and fragmented learning.

1) Full coverage of the course system. Courses covered general education courses, basic professional courses, and core skill courses, including Basic Theory of Traditional Chinese Medicine, Normal Human Anatomy, Meridian and Acupoint Science, Acupuncture Science, Tuina Science, and Health Tuina, meeting the full-cycle learning needs from enrollment to graduation.

2) Auditory reconstruction of content. All visually dependent materials, such as pictures, charts, illustrations, and video frames, were completely removed, and all knowledge points were converted into pure voice texts. Aiming at the highly practical characteristics of Acupuncture and Tuina, perceivable, situational, and step-by-step language descriptions were used for acupoint location, bone reference, needle insertion angle, tuina manipulation, force rhythm, and operation process, enabling students to establish operational cognition through hearing.

3) Standardized recording and production. Professional teachers made recordings with moderate speed, reasonable pauses, clear logic, and no noise. Single-section duration was 15-20 minutes, suitable for fragmented learning. Each section was equipped with voice titles, chapter prompts, and key emphases for easy positioning and review.

4) Accessible playback controls. Courses in Superstarlearn (Xuexitong) supported voice reading, speed adjustment, loop playback, and breakpoint resume listening. All operations could be completed via TalkBack and VoiceOver, allowing students to learn autonomously anytime and anywhere via mobile phones.

3.3 Integrated Migration and Accessibility Optimization of Online Examinations

To form a learning-assessment closed loop, the research team migrated all course assessments from third-party platforms to the Superstarlearn (Xuexitong) APP to build a mobile accessible examination mode.

1) Standardization and visual desensitization of test questions. More than 3,200 original test questions were sorted out. Visual-dependent questions, such as picture questions and chart questions, were removed and uniformly replaced with pure text questions and options with concise language and standardized expressions, suitable for screen-reading.

2) Accessibility optimization of the examination interface and process. The examination page layout was simplified. Pre-examination voice prompts, automatic answer saving, missing question reminders, and submission confirmation were added. Screen-reading for question-by-question reading, option switching, and one-click submission were supported. Scores were announced immediately after submission to ensure an independent, stable, and secure examination.

3) Integrated examination management. Teachers completed paper creation, release, invigilation, grading, and score export on Superstarlearn (Xuexitong). Academic affairs realized unified data collection, automatic statistics, and abnormal monitoring. Students completed learning, practice, assignments, and examinations in the same APP, truly integrating teaching, learning, examination, and management.

3.4 Construction of the Evaluation System

A four-dimensional multivariate evaluation system was constructed: First, platform usability, including screen-reading recognition rate, operation fluency, functional stability, and failure rate. Second, course adaptability: including voice clarity, content comprehensibility, accuracy of practical description, and learning convenience. Third, examination fluency: including interface adaptability, reading accuracy, process stability, and answering experience. Fourth, overall satisfaction: including students' learning experience, teachers' teaching experience, and academic affairs management efficiency. Data sources included 5-point Likert scale questionnaires, course scores, and in-depth interview records.

4. Research Results and Empirical Analysis

4.1 Satisfaction Comparison Results

Satisfaction surveys were conducted among students, teachers, and academic affairs staff (full score: 5). Results showed significant improvements in all satisfaction items after the reform.

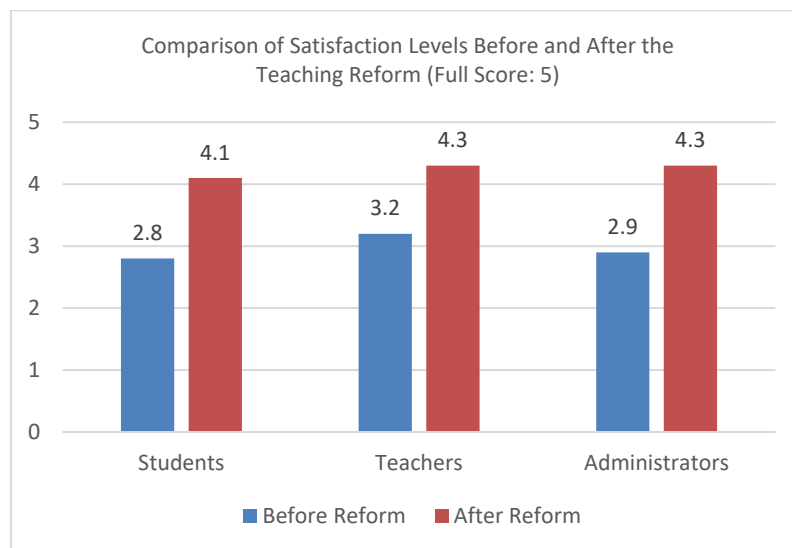


Figure 1. Comparison of Satisfaction Before and After the Reform.

Results showed that satisfaction among students, teachers, and administrators improved significantly after the reform, especially in mobile screen-reading usability, examination fluency, and learning autonomy, indicating the effectiveness of platform transformation and process integration.

4.2 Changes in Academic Data

Academic data extracted from the platform showed obvious changes before and after the reform:

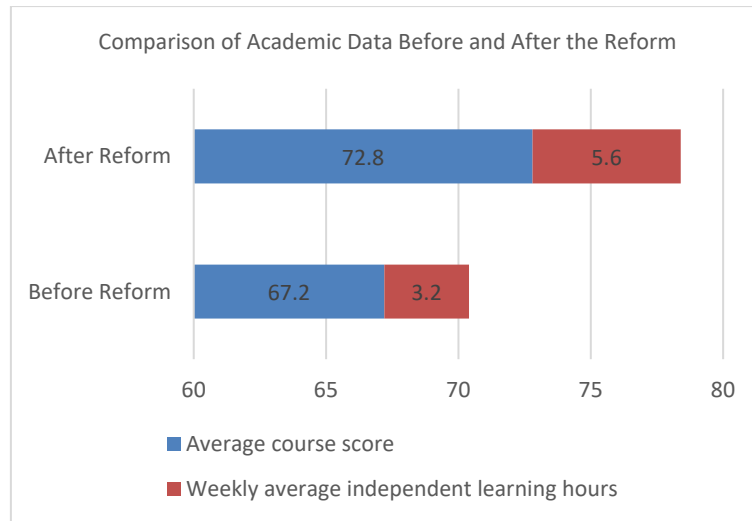


Figure 2. Comparison of Academic Data Before and After the Reform.

The significant increase in learning hours reflected higher learning motivation brought by improved mobile learning convenience. The steady improvement in grades proved that the accessible learning environment effectively supported academic quality, with significant improvements in learning stability and completion rate.

4.3 Qualitative Analysis of Usage Experience

In-depth interviews showed that students generally achieved three major changes: from “relying on assistance” to “independent full-process learning via mobile phones”; from “limited by PCs and offline difficulties” to “fragmented learning anytime and anywhere”; from “anxious about exams and passive score checking” to “stable exams and independent score checking”.

Teachers reported unified and standardized teaching resources and efficient platform management. Administrators reported integrated data and automated statistics, with management efficiency improved by more than 60% and manual errors significantly reduced.

5. Discussion

1) Mobile priority is a scientific path suitable for adult students with visual impairments. This study confirms that the structural characteristics of adult students with visual impairments—employed, mobile-proficient, and without PC access—determine that digital reform of continuing education must take the mobile-first route. The model with Superstarlearn (Xuexitong) APP as the core and in-depth adaptation to TalkBack and VoiceOver highly fits their learning scenarios and is the key to improving usability, autonomy, and sense of gain.

2) Lightweight transformation of general platforms can achieve high-quality accessibility. Commercial teaching platforms do not need complete reconstruction. Stable support for system-level screen-reading software can be achieved only through lightweight transformations such as labeling, focus optimization, process simplification, and semantic reading, with low cost, short cycle, and strong generalizability, suitable for large-scale application in ordinary universities.

3) Voice courses + learning-assessment integration are the core of quality assurance. Full-auditory voice courses solve the resource problems of “difficult to learn, unclear to hear, and hard to understand”. Integrated examinations solve the management problems of “unable to take exams, chaotic processes, and anxiety”. The combination of the two forms a closed loop and is the core pillar to ensure the quality of continuing education for students with visual impairments.

4) Research limitations. This study focused on a single major of Acupuncture and Tuina with strong professional applicability, which still needs further verification in cross-major promotion. Interactive functions such as real-time voice interaction between teachers and students, group Q&A, and group collaboration need to be further strengthened. Minor compatibility issues across different models and system versions still need continuous monitoring and optimization.

6. Conclusion

This study focused on the mobile learning needs of adult employed students with visual impairments and constructed a “mobile-first, PC-compatible” accessible digital teaching model. Through in-depth adaptation of Superstarlearn (Xuexitong) APP, construction of full-auditory voice courses, and integration of learning and assessment, it effectively solved the core obstacles in online learning for students with visual impairments.

Four main conclusions were drawn: First, the optimized Superstarlearn (Xuexitong) APP stably supports screen-reading operations on Android TalkBack and iOS VoiceOver, meeting the full-process independent learning needs of students with visual impairments. Second, the full-auditory voice course system significantly improves learning comprehension, sustainability, and completion quality. Third, the learning-assessment integration model effectively reduces operational costs and improves learning closed loop and management efficiency. Fourth, the lightweight accessible transformation model based on general platforms has strong feasibility, economy, and promotional value.

The implementation plan, technical path, evaluation system, and practical paradigm formed in this study can provide academic references and practical samples for universities to carry out digital reform of continuing education for special groups and promote educational equity.

7. Future Optimization Directions

Improvements will be made in three aspects: First, deepen mobile accessibility adaptation and further optimize compatibility across different models and system versions. Second, strengthen interactive functions such as real-time voice interaction, online Q&A, and group collaboration to enhance learning engagement. Third, establish a long-term mechanism for dynamic course updating, regular platform monitoring, and rapid technical response to promote the development of adult academic continuing education for students with visual impairments toward higher quality, efficiency, and equity.

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References

- Cai, C. (2020). Research on the current situation of information accessibility in online learning for college students with visual impairments. *Modern Special Education*, (12), 58-66.
- Li, J. (2025). The right to information accessibility in the digital age: Concept, legal theory and prospects. *Disability Research*, (06), 46-55.
- Li, J. J. (2019). The new era of “Internet + education”: Information technology helps build efficient professional classrooms in secondary vocational schools for the blind. *Modern Vocational Education*, (10), 240-241.
- Lu, H. X. (2025). Research on the digital transformation path of teaching for students with visual impairments empowered by technology. *Anhui Education Research*, (6), 116-119.
- Ma, J. (2023). Research on the application of digital learning in special education schools. In *Competency-oriented model reform · Digital empowerment for quality improvement: Proceedings of the 8th symposium on digital teaching in primary and secondary schools* (pp. 219-221). <https://doi.org/10.26914/c.cnkihy.2023.000000>
- Ministry of Education. (2021). The 14th five-year plan for the improvement and development of special education.
- National Information Technology Standardization Technical Committee (SAC/TC 28). (2025). General specification for information accessibility of mobile intelligent terminals: GB/T 46070-2025. China Standards Press.
- Shen, C. Y. (2025). On the teaching reform of “Tuina Manipulation” for visually impaired students in higher vocational colleges from the perspective of interdisciplinary integration. *Modern Vocational Education*, (08), 117-120.