



**EFL TEXTBOOKS FOR BLIND AND VISUALLY IMPAIRED PUPILS IN
UZBEKISTAN: A UNIVERSAL DESIGN
FOR LEARNING APPROACH**

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Abstract. Learning English can be challenging for blind and visually impaired (BVI) pupils because conventional textbooks rely heavily on visual elements, including pictures, colours, and page layouts. This reliance limits BVI learners’ access to both the materials and the content conveyed through them. This study examined the potential of redesigning EFL materials according to the principles of Universal Design for Learning (UDL). The study was conducted at School-Boarding School No. 77 “Nurli Maskan” in Tashkent, where English is taught using the Grade 5 coursebook *Guess What!*. Three units of the coursebook were redesigned in accordance with UDL principles. In addition to existing braille materials, the adapted resources included audio materials, tactile aids, and screen-reader-compatible digital files. The study consisted of three phases. First, interviews were conducted with 15 BVI pupils and 8 English teachers to identify classroom learning barriers. Second, UDL-based instructional materials were developed. Third, a four-week pilot study was conducted with 20 fifth-grade pupils, who were divided into experimental and control groups of equal size. By the end of the pilot, the experimental group showed a mean improvement of 24.6 points, compared with 10.7 points in the control group. Pupils in the experimental group also demonstrated higher levels of classroom engagement, confidence, and satisfaction. Given the short duration of the pilot and the small sample size, these findings should be interpreted as preliminary. Nevertheless, they suggest that UDL may provide an effective framework for improving English-language learning opportunities for BVI pupils in Uzbekistan.

Keywords: blind and visually impaired (BVI) pupils; Universal Design for Learning (UDL); EFL textbook; inclusive education; Guess What 5!; Uzbekistan.

**O‘ZBEKISTONDAGI KO‘ZI OJIZ VA ZAIF KO‘RUVCHI O‘QUVCHILAR
UCHUN INGLIZ TILI DARSLIKLARI:
UNIVERSAL TA’LIM DIZAYNI (UDL) YONDASHUVI**

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Annotatsiya. Ingliz tilini o‘rganish ko‘zi ojiz va zaif ko‘ruvchi (BVI) o‘quvchilar uchun murakkab hisoblanadi, chunki an’anaviy darsliklar rasmlar, ranglar va sahifa dizayni kabi vizual elementlarga boy bo‘lib, bu esa BVI o‘quvchilarning ulardan va ular bilan bog‘liq mazmundan to‘liq foydalanish imkoniyatini cheklaydi. Ushbu tadqiqot mazkur muammoni hal etish maqsadida o‘quv materiallarini Universal ta’lim dizayni (Universal Design for Learning — UDL) tamoyillari asosida qayta ishlab chiqish imkoniyatlarini o‘rgandi. Tadqiqot Toshkent shahridagi 77-sonli “Nurli Maskan” maktab-internatida amalga oshirildi. Mazkur muassasada ingliz tili 5-sinf uchun mo‘ljallangan Guess What! darsligi asosida o‘qitiladi. Ushbu darslikning uchta bo‘limi UDL tamoyillariga muvofiq qayta ishlab chiqildi. Mavjud Brayl materiallariga qo‘shimcha ravishda audio materiallar, taktil vositalar hamda ekran o‘quvchi dasturlar bilan mos keladigan elektron fayllar yaratildi. Tadqiqot uch bosqichda olib borildi. Dastlab, sinfdagi o‘quv jarayonida uchraydigan muayyan qiyinchiliklarni aniqlash maqsadida 15 nafar ko‘zi ojiz va zaif ko‘ruvchi o‘quvchi hamda 8 nafar ingliz tili o‘qituvchisi bilan suhbatlar o‘tkazildi. Keyingi bosqichda UDL asosida moslashtirilgan yangi o‘quv materiallari ishlab chiqildi. So‘ngra 20 nafar beshinchi sinf o‘quvchisi ishtirokida to‘rt haftalik pilot tadqiqot o‘tkazildi. O‘quvchilar teng sonli eksperimental va nazorat guruhlariga ajratildi. Tadqiqot yakunida eksperimental guruh natijalari o‘rtacha 24,6 ballga yaxshilangani, nazorat guruhida esa bu ko‘rsatkich 10,7 ballni tashkil etgani aniqlandi. Bundan tashqari, eksperimental guruh o‘quvchilarida darsdagi faollik, o‘ziga ishonch va o‘quv jarayonidan qoniqish darajasi yuqoriroq bo‘lgani kuzatildi. Shunga qaramay, ushbu qisqa muddatli pilot tadqiqot yakuniy xulosa emas, balki dastlabki ijobiy natija sifatida baholanishi lozim. Natijalar UDL yondashuvi ko‘zi ojiz va zaif ko‘ruvchi o‘quvchilarning ingliz tilini o‘rganish samaradorligini oshirishda istiqbolli va samarali metodologik asos ekanligini ko‘rsatadi.

Kalit so‘zlar: ko‘zi ojiz va zaif ko‘ruvchi (BVI) o‘quvchilar; Universal ta’lim dizayni (UDL); ingliz tili darsligi; inklyuziv ta’lim; *Guess What! 5*; O‘zbekiston.

Introduction

People with disabilities continue to face substantial barriers to accessing education worldwide. According to the World Health Organization, approximately 1.3 billion people, or one sixth of the global population, live with significant disabilities (World Health Organization, 2022). Visual impairment represents an especially important dimension of this challenge. Globally, around 2.2 billion people experience some form of vision impairment, and nearly one billion cases could have been prevented or remain untreated (World Health Organization, 2019). Approximately 43 million people are blind, while a further 295 million experience moderate to severe distance vision impairment.

Uzbekistan faces similar challenges. Available national statistics may not fully reflect the scale of disability in the country. A World Bank assessment noted that only 2.1% of Uzbekistan's population was officially registered as having a disability, compared with a global estimate of approximately 15%, which may indicate substantial under-registration (World Bank, 2022). By the end of 2019, nearly 693,900 people were receiving disability pensions, including 111,300 children under the age of sixteen (World Bank, 2022). The same assessment identified major shortcomings in the education system, including limited accessibility of school infrastructure, a shortage of qualified special education personnel, and insufficient provision of braille textbooks and other adapted learning materials. These constraints create persistent barriers to the education of blind and visually impaired (BVI) children.

The challenges are particularly evident in English-language classrooms. Many EFL coursebooks rely heavily on visual resources, such as photographs, maps, colour-coded tasks, captions, and page layouts. Although braille versions of textbooks may be available, they often reproduce printed materials without sufficient adaptation of visual content or provision of audio and tactile alternatives. As a result, BVI pupils may have limited access to the information conveyed through images and graphic design (Ranasinghe et al., 2025). In the absence of accessible materials, teachers may rely primarily on oral explanation, grammar-translation activities, or audio-lingual routines. Such practices can reduce learners' independence and limit opportunities for active participation in the classroom (Amirabadi et al., 2024).

Universal Design for Learning (UDL) offers a relevant framework for addressing these barriers. Developed by CAST, UDL encourages curriculum designers to anticipate learner variability and to provide multiple means of engagement, representation, and action and expression (CAST, 2018). These principles address, respectively, why learners engage with content, how they access information, and how they demonstrate learning. Previous research has reported positive effects of UDL on learner engagement and access to instruction. However, findings related to academic achievement remain mixed. Capp's (2017) review of eighteen studies found that UDL supported engagement in diverse classrooms but noted that evidence of its effect on academic outcomes remained limited. Similarly, Ok et al. (2017), in a

review of thirteen school-based studies, reported improved access and engagement but variable achievement outcomes.

Most existing research on UDL has been conducted in North America and Western Europe. There is limited evidence on the use of UDL for BVI learners in Central Asia, particularly in relation to the adaptation of English-language textbooks. This study therefore addresses the following research questions:

1. What difficulties do blind and visually impaired pupils in Uzbekistan encounter when using EFL textbooks?
2. How can UDL principles be used to adapt existing coursebook units into accessible learning materials for these pupils?
3. Do UDL-adapted units improve BVI pupils' learning outcomes and engagement compared with standard braille materials?

In recent years, Uzbekistan has strengthened its legal and policy framework for protecting the rights of persons with disabilities and promoting inclusive education. Key developments include the 2017 Presidential Decree on additional state support and access to higher education for persons with disabilities, as well as the adoption of the Law "On the Rights of Persons with Disabilities" in 2020. The national policy on inclusive education for 2020–2025 aimed to increase the proportion of children with disabilities enrolled in general secondary education to at least 40% by 2025, compared with a reported baseline of 16.5%. Uzbekistan also ratified the UN Convention on the Rights of Persons with Disabilities in 2021.

Despite these policy commitments, implementation at the classroom level remains uneven. Independent assessments continue to identify barriers related to inaccessible educational environments, insufficient specialist support, and a lack of adapted learning materials, including braille textbooks. This study examines the gap between policy commitments and everyday educational practice. It considers whether feasible adaptations to EFL coursebook materials can contribute to more accessible learning environments and support the implementation of Article 24 of the UN Convention on the Rights of Persons with Disabilities and Sustainable Development Goal 4.

2. Methods

2.1. Research design

This study employed a Design-Based Research (DBR) approach to develop and evaluate accessible EFL materials for blind and visually impaired (BVI) pupils. DBR is appropriate for this purpose because it supports the development, implementation, and refinement of educational interventions in authentic classroom settings through iterative cycles of analysis, design, implementation, and evaluation.

The study involved one DBR iteration conducted in three phases: needs analysis, material adaptation, and pilot evaluation. Fieldwork was carried out between January and June 2025. The duration, participants, and methods used at each stage are presented in Table 1.

Table 1

Overview of the three-phase study design

Phase	Focus	Participants	Main methods
Phase 1: Needs analysis	Identify limitations of existing materials	15 BVI pupils; 8 EFL teachers	Semi-structured interviews; classroom observation; thematic analysis
Phase 2: Adaptation	Redesign three coursebook units according to UDL principles	Researcher, informed by Phase 1 findings	CAST UDL Guidelines; production of braille, large-print, audio, tactile, and digital materials
Phase 3: Pilot and evaluation	Compare adapted braille materials with standard materials	20 Grade 5 pupils, divided into two groups of 10	Quasi-experimental comparison; pre- and post-tests; survey; independent-samples t-tests

2.2. Participants and setting

The study was conducted at School-Boarding School No. 77 “Nurli Maskan” in Tashkent, a specialised school for children with visual impairments. English is taught there using the Grade 5 coursebook *Guess What!* (Reed & Bentley, 2021), available in braille transcription. This setting was therefore suitable for testing the adapted materials.

Participants were selected purposively. The needs-analysis phase involved 15 BVI pupils aged 12 to 18 years, including eight blind pupils and seven pupils with low vision. Eight English teachers, each with at least three years of experience teaching BVI learners, also participated.

The pilot study involved a separate group of 20 Grade 5 pupils. Ten pupils used the UDL-adapted units, while ten pupils continued to use the standard braille coursebook. The groups were comparable in age, pre-test English scores, and degree of visual impairment.

Participation was voluntary. Pupils provided assent, and parental consent was obtained for participants under the age of eighteen. The study was approved by the relevant institutional ethics committee.

2.3. Phase 1: Needs analysis

The first phase examined the experiences of pupils and teachers using existing EFL materials. Each of the 15 pupils and 8 teachers took part in an approximately 20-minute semi-structured interview. Several English lessons were also observed.

The interviews focused on four areas: the usability of existing textbooks; difficulties with grammar and vocabulary tasks; preferred learning formats, including audio, tactile, and digital materials; and factors affecting learner motivation.

With participants' permission, interviews were recorded and transcribed. The data were analysed using Braun and Clarke's (2006) reflexive thematic analysis. Recurrent responses were grouped into themes, while classroom observations provided additional context for interpreting the interview data.

2.4. Phase 2: Adaptation of coursebook units

Rather than developing a new textbook, the study adapted three units from the Grade 5 *Guess What!* coursebook (Reed & Bentley, 2021). The selected units were: Unit 1, “Around the World”; Unit 2, “Family and Pets”; and Unit 3, “On the Playground.” These units were selected because they rely heavily on visual materials, including maps, photographs, and illustrated scenes.

The adaptations were guided by the three UDL principles described by CAST (2018): multiple means of representation, action and expression, and engagement.

Representation. Textual materials were provided in Uzbek braille, including contracted and uncontracted versions, as well as in 18-point high-contrast large print. Audio recordings included dialogues and vocabulary items. Tactile graphics replaced visual materials where appropriate, including a raised-line world map for Unit 1.

Action and expression. Pupils could respond orally, make voice recordings, write in braille, or complete tasks digitally using a screen reader. Digital exercises provided immediate spoken feedback.

Engagement. The adapted units included familiar contexts, such as a Tashkent market and local playgrounds, and offered pupils opportunities to choose topics of personal interest. Each unit also included a brief self-assessment activity.

The completed materials were produced in four formats: printed braille, large print, audio, and tagged PDF files compatible with NVDA and JAWS screen readers. NVDA was selected as the reference screen reader because it is free of charge and was already available on the school’s computers. This also enabled pupils to use the same software at home.

The adaptation process did not alter the language content or learning objectives of the original coursebook. Vocabulary, grammar, and target skills remained unchanged. Instead, the adaptations modified the means through which pupils accessed and practised the content. Tasks based on photographs, maps, or colour-coded elements were replaced with alternatives that did not depend on visual perception. Table 2 presents examples of the adaptations applied across the three units.

Table 2

Examples of task adaptations across the three units

Original task	UDL-adapted task	UDL principle
Unit 1: Four captioned photographs with birth dates	Four audio profiles followed by questions and answers	Representation; action and expression
Unit 1: Locate countries on a world map	Raised-line tactile map with braille labels; pupils place textured country cards and produce sentences	Representation
Unit 2: Personality adjectives presented through family and circus photographs	Short audio scenes paired with textured word cards	Representation
Unit 2: Comparatives based on an illustration of two pets	Pupils compare classmates or their own pets using tactile sentence-building tiles	Action and expression; engagement
Unit 3: Identify actions in a playground picture	Playground soundscape followed by action-identification and performance tasks	Representation; action and expression
Unit 3: Imperatives based on picture prompts	Spoken command game in which pupils give and follow instructions	Action and expression; engagement

2.5. Phase 3: Pilot study and evaluation

The pilot study lasted four weeks. Grade 5 pupils attended three English lessons per week, resulting in twelve lessons in total. The experimental group used the UDL-adapted units, while the control group studied the same content using the standard braille coursebook.

The same teacher taught both groups in order to reduce differences associated with teaching style. Three instruments were used for data collection.

Achievement test. The test included 40 items: 20 vocabulary items, 10 grammar items, and 10 reading-comprehension items. It was administered in braille or large print and read aloud for blind pupils. The same test was used as both the pre-test and post-test.

Engagement survey. The survey contained ten statements rated on a five-point Likert scale, from 1 (“strongly disagree”) to 5 (“strongly agree”). The statements addressed motivation, interest, perceived accessibility, and ease of working with the materials.

Accessibility checklist. Pupils evaluated the ease of navigation, clarity of audio materials, and usability of tactile components.

Gain scores were compared using independent-samples t-tests. Cohen’s *d* was calculated from group means and standard deviations to estimate the magnitude of the observed effects. Open-ended responses were analysed thematically. The instruments are reproduced in Appendix B.

3. Results

The interviews returned four barriers, and they returned them clearly (Table 3). All eight teachers said the same thing in different words: the braille books were the print book turned into dots and nothing more, with no help for the ear or the hand. Among the pupils, six of the fifteen admitted that they often left English homework undone, for the plain reason that they could not do the exercises without someone beside them.

Table 3

EFL Learning Barriers (Phase 1)

Barrier	Representative quotation
Lack of audio support	“I cannot hear how words are pronounced. The braille book shows letters but no sound.” (Pupil, blind)

Inaccessible visuals	“The textbook has many pictures and maps. My teacher tries to describe them, but it takes too long and I still don’t understand.” (Pupil, low vision)
Limited tactile graphics	“There are almost no raised-line drawings. I cannot imagine what a ‘market’ or ‘bus stop’ looks like.” (Pupil, blind)
Teacher dependency	“I have to read everything aloud for them. It makes the lesson very slow, and they feel embarrassed to ask questions.” (Teacher)

Against that baseline, the redesigned units were put to the test. The two groups set out level (experimental M = 52.4; control M = 51.8), but four weeks later the two had diverged. The experimental group gained 24.6 points, more than twice the control group’s 10.7 (Table 4; Figure 1), and the difference between the gains was statistically significant ($t = 3.98, p < .001$). The effect sizes were large throughout: roughly $d = 3.2$ within the experimental group, $d = 1.3$ within the control group, and $d = 1.8$ between them. With only ten pupils in each group, these figures are best read as indicative rather than exact.

Table 4

Pre- and Post-Test Scores by Group

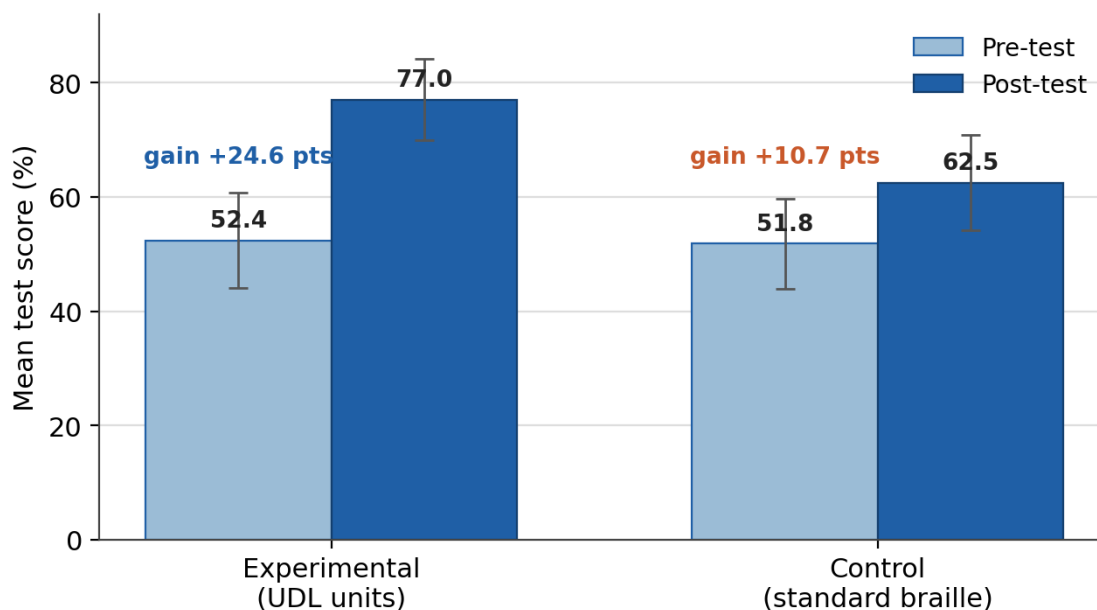
Group	N	Pre-test M (SD)	Post-test M (SD)	Mean gain	t	p
Experimental (UDL)	10	52.4 (8.3)	77.0 (7.1)	24.6	6.82	< .001
Control (standard)	10	51.8 (7.9)	62.5 (8.4)	10.7	3.14	.006

Figure 1

Pre- and post-st mean scores by group; error bars show standard deviations

The same gap appeared in how pupils felt about the work (Table 5; Figure

Figure 1. Pre- and post-test mean scores by group (error bars = SD)



2). In the experimental group, 85 percent agreed or strongly agreed with every statement on the survey; in the control group, only 20 percent did. The widest distances were over working without help (4.5 against 2.8) and wanting to carry on with the material (4.8 against 3.0), which lines up with what the test scores had already hinted at about independence.

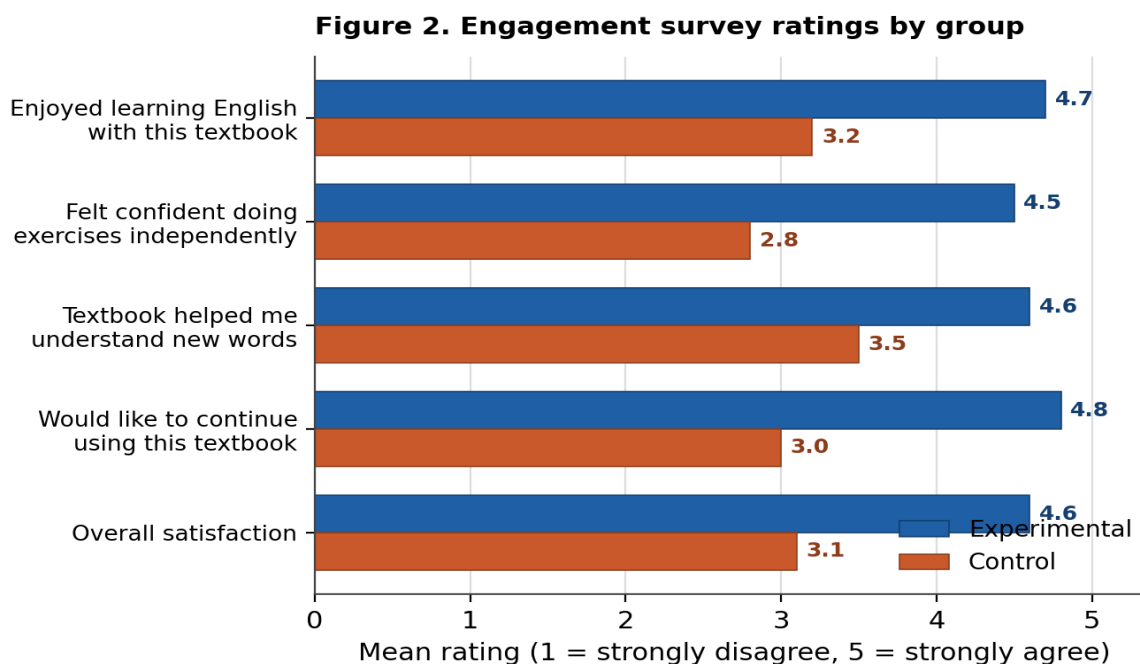
Table 5

Engagement survey results (1 = strongly disagree to 5 = strongly agree)

Survey item	Experimental M (SD)	Control M (SD)
I enjoyed learning English with this textbook	4.7 (0.5)	3.2 (0.9)
I felt confident doing exercises on my own	4.5 (0.7)	2.8 (1.1)
The textbook helped me understand new words	4.6 (0.5)	3.5 (0.8)
I would like to continue using this textbook	4.8 (0.4)	3.0 (1.0)
Overall satisfaction	4.6 (0.5)	3.1 (0.8)

Figure 2

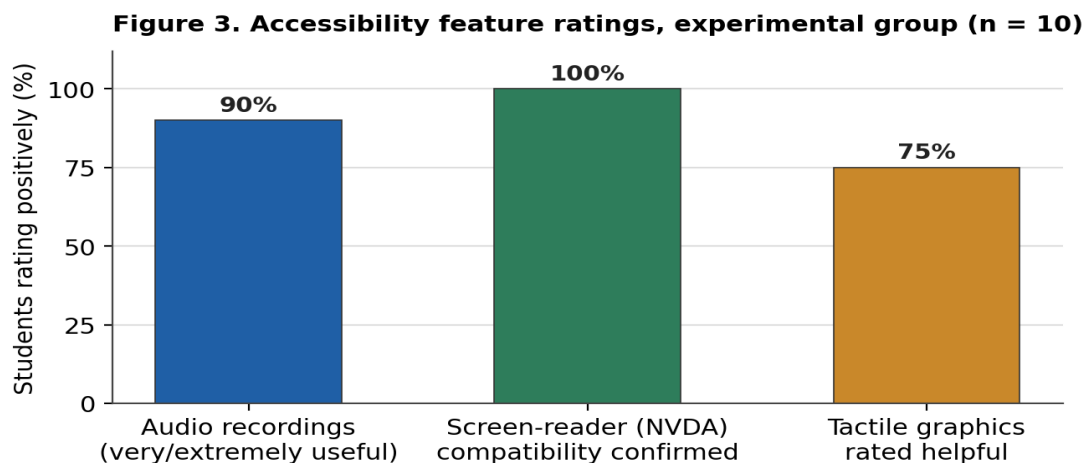
Mean engagement ratings by group across the five core survey items



Asked directly about the accessible features, pupils were warm about most of them (Figure 3). Ninety percent rated the recordings very or extremely useful, and every blind pupil confirmed that NVDA read the PDF without trouble. The tactile graphics drew a cooler response: three-quarters found them helpful, but a quarter said some of the raised lines sat too close together to tell apart. Three pupils asked for pronunciation quizzes that used voice recognition.

Figure 3

Accessibility feature ratings, experimental group (n = 10).



4. Discussion

The above-mentioned results suggest that reworking coursebook units along UDL lines can lift the learning, the engagement, and the access of BVI pupils in Uzbekistan at the same time. A gain of almost 25 points in four weeks is sizeable for so short a period, and the margin over the standard braille materials is clear. The direction fits the earlier reviews, which credit UDL with sharpening how a mixed class engages (Capp, 2017; Ok et al., 2017). Those reviews also warn that the gains on actual outcomes come and go, and a small study in a single school is no place to set that warning aside.

Upon analyzing student engagement closely, the most obvious change was the immediate improvement in autonomy; the use of both auditory and tactile technologies gave them more autonomy as opposed to adopting the common practice of waiting for sighted guidance. Nevertheless, our results have revealed an important wake-up call; 25% of the pupils had trouble working with tactile graphics owing to a shortage of materials and proper instruction, indicating that we have to conduct pilot testing of such materials among blind pupils using international guidelines such as BANA. Though our research has many parallels with the scientific literature emerging from Sri Lanka, Iran, and Columbia, this study breaks new ground by focusing on Central Asia. In all essence, this study is a clear message for scholars and policy-makers that inclusive solutions do not have to be technologically complex and costly; a combination of well-thought-of strategies such as tagging of PDF documents and audio guides, in addition to tactile images, can make an entirely different learning experience for a student.

Numerous factors must be acknowledged while analysing these results. The experiment was succinct, spanning about four weeks, and depended on a limited sample size of twenty pupils. Therefore, the substantial favourable benefits found in this study are anticipated to decrease in a more extensive, long-term investigation. Moreover, the absence of a delayed post-test in the research renders it ambiguous if these learning advancements are enduring or applicable to novel academic material. The institutional context of the study constrains the applicability of the results to other environments. The study was carried out in Tashkent at an institution that possesses superior funding and resources compared to standard rural schools. The achievement exam employed to assess student progress was uniquely created for this study and lacks external validation. Ultimately, employing a single instructor for both groups effectively mitigated variations in teaching approaches, however also created a possible confounding component. The heightened scores may have resulted from the teacher's personal enthusiasm for the new

curriculum materials rather than the intrinsic effectiveness of the items themselves.

As seen in our research, closing the legal-policy-practice gap in Uzbekistan means developing all forms of learning aids—such as braille, audio, tactile, and digital—from the outset, using Universal Design for Learning (UDL) principles, as opposed to adapting ordinary textbooks retroactively once they have been printed. To implement such an approach, teachers need to be provided with professional training in the use of assistive technologies, which could be done at scale through collaboration with international organizations such as UNESCO, UNICEF, and the World Bank. More than anything else, however, the Ministry needs to plug the legal gap in Law No. LRU-641 by introducing mandatory state regulations, instead of voluntary guidelines, stipulating that all textbook versions are to be released at once and that UDL requirements should be integrated into procurement procedures. In other words, the establishment of clear standards and deadlines for producing and delivering all forms of learning aids before the start of each school year is what makes the difference.

Conclusion

Our study proves that UDL-based modification of already existing textbooks provides a solution for making English accessible and usable for visually impaired pupils in Uzbekistan. Based on four weeks of implementation of the curriculum for Grade 5, it was found out that the use of UDL-based modifications of English lessons resulted in much more significant achievement of the intended goals, improvement of pupils' motivation, and accessibility scores compared to braille. It should be noted that certain difficulties still exist in terms of the quality of tactile graphics provided to visually impaired pupils; nevertheless, the experiment proves that the use of UDL can be considered an appropriate solution when implementing the school reform in the country.

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