**MINISTRY OF PRESCHOOL
AND SCHOOL EDUCATION
OF THE REPUBLIC OF UZBEKISTAN**

30 years in Uzbekistan

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for every child

IMPROVING LEARNING OUTCOMES IN UZBEKISTAN: A JOURNEY WITH EDUTEN

SUMMARY

The Republic of Uzbekistan has been implementing pathbreaking reforms in various aspects of digital learning, underpinned by the adoption of the Digital Strategy 2030 and the introduction of new approaches and initiatives as part of its ongoing education reform, supported by the Partnership Compact for Education Reform 2023-2026. In order to harness the power of connectivity and accelerating the adoption of world-class digital learning tools, the Ministry of Preschool and School Education (MOPSE) has worked hand-in-hand with UNICEF and its Global Learning Innovation Hub in the adaptation of a new quality digital learning solution – **Eduten** – focused on increasing learning outcomes and teachers' performance.

This brief summarizes the findings of the impact of a 12-week pilot research project carried out among grade five students in general secondary schools in Uzbekistan. The goal of the pilot was to evaluate the effectiveness of Eduten EdTech tool (an AI-based gamified digital exercises, assessment, and learning analytics) in improving student learning outcomes in basic mathematics, motivation, and its ability to reduce teacher workloads through automated task marking and personalized learning approaches. This pilot was designed as an effective approach to address existing challenges experienced by learners, as highlighted by the results of the Programme for International Student Assessment (PISA) 2022 results showing that over 80 per cent of 15-year-old students did not meet basic level of proficiency (Level 2) in mathematics, science and language.

Eduten adapts to students' needs, making math enjoyable while teachers receive valuable analytics to support each student

UNLOCKING POTENTIAL: AN EXAMPLE OF LEVERAGING EDTECH TO TRANSFORM LEARNING

In a primary school in the Tashkent region of Uzbekistan, children gather around a screen with excitement. One can hear laughter and cheering. They are deeply engaged in the process of learning mathematics and improving their numeracy skills. In September 2023, the Learning Innovation Hub partnered with the UNICEF Country Office in Uzbekistan and MOPSE to pilot **Eduten**, an **AI-based gamified digital math learning platform** used in many countries since 2017. Eduten is the **recipient of the first UNICEF EdTech Award** in 2022, winning over 140 applications. It is backed by 15 years of university research and uses AI to provide automated learning analytics to teachers, to better understand and monitor student learning progress.

The Eduten pilot in Uzbekistan covering Grade 5 school students [1] has demonstrated the transformative potential of EdTech to ignite engagement of both students and teachers; and to enhance student learning outcomes.

Eduten places **teachers at the center**, starting with teacher training, and is integrated as part of a regular math lesson. The Eduten platform features over 200,000 quality math exercises that are then aligned with the national curriculum. It also provides learning analytics, helping the teacher understand how students are progressing, identify those who are struggling, and on what topics. In addition, it helps teachers understand formative assessments and see first-hand adaptive, personalized learning in action. Its learning analytics dashboard also provides insights for school administrators, district and provincial authorities and the central level Ministry of Education on student and school performance.

For students, the gamified exercises adapt to their mastery level, making math enjoyable and engaging. As one student eloquently put it, "I never liked math before, but now I find it exciting."

IMPACT ON STUDENT LEARNING OUTCOMES IN UZBEKISTAN

[1]   The pilot was small-scale, covering 527 students in Uzbekistan who used Eduten.

[2]   Running a small-scale pilot is consistent with the OOI Innovation Methodology with the pilot designed to understand what works and doesn't to influence acceleration and scale-up. Evidence generation is a critical component of the pilot.

Results [2] show that students who used Eduten at least once a week for 12 weeks during math lessons in class, supplemented by use at home/after class hours achieved better results in math and numeracy tests compared to their peers who did not use Eduten. Two groups of students were formed: a treatment group composed of students who replaced one school mathematics lesson a week with Eduten; and a control group who continued to have their math lessons with no additional intervention. Both groups received the same amount of math instruction.

Grade 5 students in Uzbekistan using the Eduten platform as part of their math lesson. See also the short video
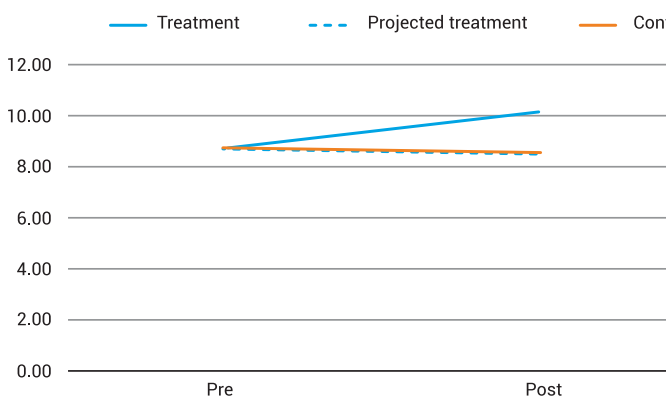
Before the pilot, all tasks and content of Eduten platform were mapped against the National curriculum and aligned with expected learning outcomes for grade five Math subject. Weekly exercises in Eduten exactly matched whatever topic the teacher was teaching every week. The context, tasks and interface were translated into Uzbek language.

The groups were tested before (pre-test) and after (post-test) the pilot duration period. Two tests were administered: arithmetic fluency test provided by Eduten[3]; and a math test developed together with the respective MoEs ensuring it matched what students were supposed to learn in their usual math classes for the Grade. Both tests were administered using pen-and–paper to ensure equity between the groups and not to favor the treatment group.

There was a statistically significant improvement in math skills in the treatment group using Eduten compared to the control group that didn't use Eduten. The treatment group improved their results by +16.9% on average whereas the control group did not improve. This means that there was an evident improvement in the learning outcomes of students using Eduten compared with their projected learn-ing levels if they did not use Eduten. More detailed results are shown in the *figure 1*.

The teachers received automated learning analytics to help the teacher under-stand the current strengths and challenges of each of their students. Each teacher with the support of the platform could easily offer each student exercises aligned

Mathematics, Improvement

Arithmatics fluency, Improvement

[3] This test measures how many one-digit basic arithmetic facts, or simple calculations, students can solve within a three-minute span. In total there are 160 calculations in the test. The maximum score from this test is 160. This test has been developed at the University of Turku, Finland and used in multiple previous studies.
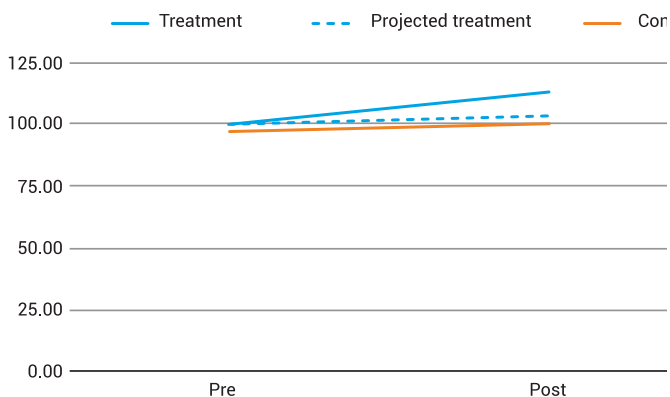
Figure 1: Results from the Eduten pilot in Uzbekistan covering Grade 5 students.
The left figure shows mathematics improvement (pre- and post-test) with effect size 0.44 SD, p<.001, for the treatment group vs the control group. The average score of the control group was lower in the post-test hence the negative improvement score. On the right, the improvement in arithmetic fluency has effect size 0.29 SD, p<.001, for the treatment vs the control group. The dotted lines show the projected value for the treatment groups if there were no treatment effect (based on the con-trol group).

Lesson progress

All (21)	⚠ Alert (5)	⊘ Done (17)					
Name	Accuracy	Level	Time	Easy	Moderate	Hard	
Search		Search	Search	Search	Search	Search	Search
Joanne	100%	Diamond	3h 24 min	6 x	3 x	0	
Kelly	99%	Diamond	2h 34 min	7 x	0	0	
Jacob	81%	Gold	1h 38 min	4 x	0	0	
Pearl	78%	Gold	2h 2 min	3 x	0	0	
Brandon	76%	Gold	1h 36 min	3 x	0	0	
Morgan	73%	Silver	5h 29 min	2 x	0	0	
Ella	65%	Silver	2h 55 min	0	1 x	0	
Hashim	65%	Silver	2h 9 min	0	0	0	
Ben	61%	Silver	1h 45 min	0	0	0	
Brianna	61%	Silver	1h 19 min	0	0	0	
Keaton	61%	Silver	1h 14 min	0	0	0	
Layla	61%	Silver	3h 29min	0	0	0	
Maisy	61%	Silver	3h 7min	0	0	0	

Students, using Eduten demonstrated significant improvement in learning outcomes and math skills

Figure 2: On the top is an example Eduten dashboard showing student progress (stats collected include time on task, activity completion, accuracy, areas of difficulty, etc.). *On the bottom is a screenshot of one of the gamified exercises in Eduten.*
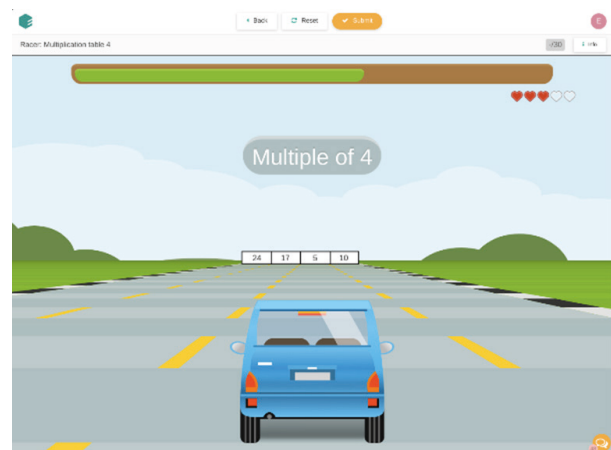
to their learning level. For example, those students that were more advanced could get more challenging exercises, and those behind could get easier ones. This enhanced motivation for everyone personalizing learning for each student. To prepare the teachers and principals for the pilot, grade 5 math teachers at selected schools were trained on the usage of Eduten, and how to support their students with the tool.

Teachers highlighted the very positive response to the gamification elements in Eduten which increased student engagement. For example, teachers shared that even during the holiday break students were requesting to open more exercises in the platform, and parents who could afford it bought devices for their children since they were able to understand the power of technology to improve learning.

These transformative results go beyond mere statistics; they present a solid evidence base on how the **proper use of EdTech** tools can improve teacher and student engagement and learning outcomes. It has also opened doors for potential private-public collaboration facilitated by UNICEF with the Hub also researching business models for sustainability.

The pilot results will inform future steps and expected to be a part of larger initiatives to bring innovative approaches that harness the power of digital solutions to improve learning in the country

DETAILED RESULTS

The results of the pilot activity provided by learning analytics in real time demonstrated, that:

- Eduten can deliver a strong learning impact even if each student does not have access to a personal computer device. Most students (73.1%) used a mobile device to use Eduten. The high number of mobile devices suggests that many students used their own device to access Eduten after school hours.

- Students' engagement. On average most students (77%) completed the minimum requirement every week. A substantial number of students advanced to higher achievement levels, that demonstrates their willingness to exceed the basic requirements and push their boundaries. Almost half of the students (44%) achieved the diamond trophy, which represents the completion of all exercises, weekly.

- Time on task. Every school in this pilot surpasses the recommended minimum weekly 'time on task' of 30 minutes. On average, the students spent 1 hour and 24 minutes per week on the platform across different schools. This average varies, with some schools nearly reaching 2 hours, while the lowest recorded time was 54 minutes. The time spent on the learning does not directly correlate to better results, but the way the tool is used affects the outcome as well.

- Monitoring of student activity shows relatively high at-home learning, which indicates good readiness in regard to devices at connectivity.

The attitudes of significant stakeholders toward digital learning and specifically Eduten were also evaluated. The consensus was clearly positive, indicating that **Eduten aligns well with the Uzbek education system and its needs.** However, some challenges related to infrastructure readiness were noted:

- School Managers acknowledged Eduten as a good fit for Uzbek schools and recognized its potential to significantly improve the education system. One feedback noted that there needs to be resources allocated for management as well to be able to take advantage of the analytics.

- Teachers expressed strong satisfaction with Eduten's positive impact on math education. Their main suggestions were improvements in technical equipment and increased parental engagement. Overall, the teachers support Eduten's wider national adoption (scored 4.7 out of 5.0).

- Students reported increased interest in math, a better understanding of mathematical concepts, and appreciation for effective teacher support using Eduten.

In conclusion, the research project has highlighted how **Eduten can significantly benefits principals, teachers, and students who regularly use it for learning mathematics**. Some of the key takeaways include that a high quality teacher train-

ing and support is vital for a successful implementation, and the importance of a tool (like Eduten) to enable teachers to provide tailored support for every student regardless of their skill level.

The pilot results are relevant to inform future steps and expected to be a part of larger initiatives to bring innovative approaches that harness the power of digital solutions to improve learning in the country.

Proper integration of EdTech in the education system will require a systems approach, including government leadership, curriculum aliment, upskilling of teachers etc.

BEYOND EDUTEN: EDTECH FOR GOOD

The Eduten pilot has highlighted the importance of a **systems approach** and providing a **comprehensive package** in countries to transform learning. The pilot showed that for EdTech tools like Eduten to be scaled and benefit all children, while infrastructure is critical (i.e., shared access to devices, connectivity, electricity), of equal importance is government leadership, planning, curriculum alignment and integration, and upskilling of teachers in digital pedagogy. It also reinforces the importance of UNICEF innovating for children and challenging business as usual approaches.

Eduten is just one of the potential EdTech tools that the Learning Innovation Hub hopes to identify and work with countries to pilot, accelerate and scale. The Hub's **Blue Unicorn Farm learning portfolio** will provide investments in high-impact, highly scalable EdTech tools from around the world **democratizing access to world-class transformative tech-based learning tools with a proven impact on learning outcomes.**

As more are more countries are integrating technology in the education system, Governments are also grappling with the lack of standards on what makes a good EdTech tool and what's best for their country context. To this end, the Hub has developed the **EdTech for Good Curation Framework** that emphasis safety, evidence of impact, scalability, inclusion and accessibility as over-arching principles. The Framework will serve as the main reference for the curation of high-impact, highly scalable EdTech tools that will be featured in the **Learning Cabinet**, an online platform accessible to the public. The **Learning Cabinet** to be launched in November 2024 aims to be the go-to trusted place for vetted global EdTech tools that have a proven impact and can be adapted and scaled in various settings. UNICEF will also support match-making of market place offerings in the **Learning Cabinet** to government needs, through the **Gateways to Public Digital Learning** initiative, which works with governments to ensure a comprehensive approach to digital transformation of education and establishing digital learning as a public good.

These efforts complement the national priorities in advancing digital learning and innovation, acknowledging that technology and EdTech are just tools to complement broader efforts to address the learning crisis and transform learning into an exciting, accessible adventure for every child.