eduten

Impact Pilot: Eduten in Mathematics Education

The outcomes of a 6-week pilot introduction of a Mathematics Learning Platform in 16 schools in Argentina

Executive summary

This report evaluates the implementation and impact of the Eduten platform, a digital learning tool for mathematics, in 16 vocational INET schools across Argentina. In total 1500 2nd year students (14 years old) participated in the study but due to the timing only 687 answers were analyzed in the post-test. The pilot study employed a quasi-experimental **pre-test/post-test treatment/control** design with a very short six-week intervention. Students in the treatment group used Eduten alongside traditional teaching methods, while the control group continued learning with standard methods and materials. The study measured student learning outcomes and gathered teacher feedback to assess the platform's effectiveness and feasibility.

The results from the testing phase showed clear improvements in math performance among the treatment group, with an average score increase of 0.68 points, reflecting a **16.5% improvement.** In contrast, the control group's scores declined by 0.24 points, a decrease of 5.7%. This created a **significant difference of 22.2% between the groups**, highlighting the Eduten platform's potential to enhance student learning outcomes.

Activity levels on the platform varied significantly between schools, with some showing high engagement and others moderate or low, reflecting differences in implementation and access to resources.

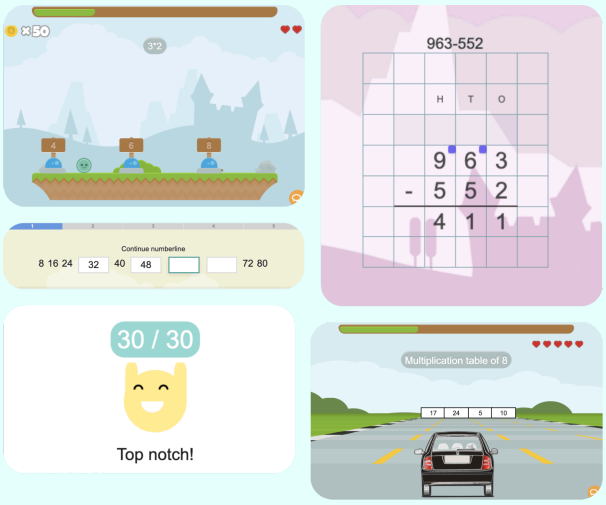
A survey conducted with teachers in the treatment schools revealed widespread support for Eduten and its role in digital pedagogy. The teachers used Eduten only 6 weeks, but still valued its ability to foster independent learning and motivate students. They also noted challenges such as limited access to devices and unreliable internet connectivity were identified as major obstacles to large-scale adoption. Curriculum alignment was another area for improvement, as better integration with existing educational standards could help reduce teacher workload and enhance teachers' effectiveness.

Despite these challenges, the findings indicate that Eduten has significant potential as a digital learning tool, offering clear benefits for students and strong support from educators. Addressing infrastructure issues and refining content alignment will be critical to ensuring its broader adoption and sustained success in diverse educational contexts.

The Eduten platform

Eduten is an AI-based exercise, assessment, and learning analytics platform that is based on over 18 years of research at the University of Turku. It is currently used in over 71% of all schools in Finland, and it has over 500k monthly active users across the world. It received the UNESCO ICT For Education Prize in 2020 and the UNICEF "Blue Unicorn" Award in 2022.

Eduten includes more than 200,000 teacher-designed tasks in Spanish for grades 1-12 that are organized in weekly practice programs and aligned with the local curriculum. The primary users are teachers who use it to coordinate pedagogical and gamified curriculum-based exercise activities for their students. In return, the teacher receives automated and real-time learning analytics to help the teacher understand the current strengths and challenges of each student. Eduten also offers analytics dashboards for monitoring entire school networks as well. Eduten be accessed with e.g. computers, laptops, tablets, or smartphones. Eduten Ltd is a spin-off company of University of Turku. Find out more at www.eduten.com/about



Training & Support

The teachers who participated in the pilot received two days of training by Eduten and Matic Soluciones Educativas in Buenos Aires, Argentina on 25 and 26 September 2024. The presentation of the Eduten trainer was transmitted virtually to the participants and the local Matic team accompanied them in person. The teachers had the opportunity to observe the use of Eduten as students and then progressed to the teacher level, where they observed the elements to be mastered in the weekly use of Eduten. During the training, the objectives of use and the working agenda were presented.

Every week the Eduten and Matic Soluciones Educativas team had a virtual meeting with the participating teachers from each school. In these meetings, doubts were solved, they were motivated to continue and, above all, they listened to the limitations that the teachers and students found in the use of Eduten.

Research methodology

The methodology of this study followed a quasi-experimental pre-test/post-test treatment/control design to evaluate the effectiveness of a six-week intervention using Eduten, a digital learning platform for mathematics. Prior to the intervention, a pre-test was conducted to establish baseline performance in both the treatment and control groups. Following the six-week period, a post-test was administered to measure changes in student outcomes.

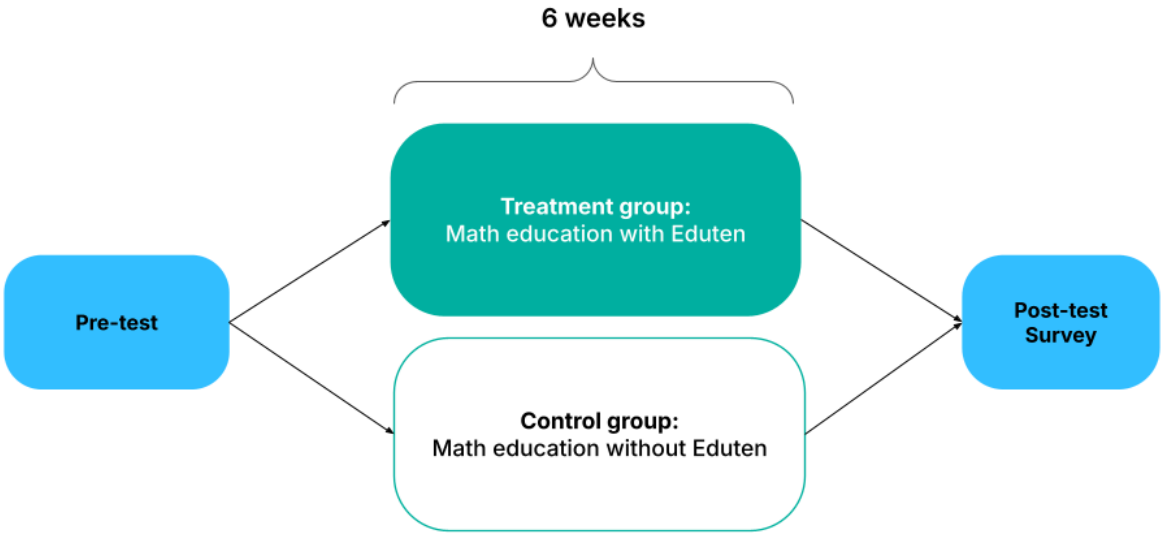


Figure 1: Research setup

The study started in October 2024 lasting for 6 weeks. During the intervention, students in the treatment group used Eduten alongside traditional tools and teaching methods to enhance their learning experience. This setup allowed for a comparative analysis of student performance between the treatment and control groups, providing insights into the impact of integrating digital tools into math education.

In addition to the tests, a post-study survey was conducted with the teachers.

School selection

The selection of schools for the pilot study was a collaborative effort led by representatives ("Referentes") from different provinces of Argentina under the coordination of the **Instituto Nacional de Educación Tecnológica (INET)**. INET plays a crucial role in the promotion of technological education across Argentina, and its representatives leveraged their expertise and local insights to identify suitable schools for the study.

The students in this study are 14 years old, 2nd year students of vocational education.

Criteria for treatment school selection

The selection of schools was based on three main criteria to ensure the feasibility and success of the pilot:

1. **Existence of electronic devices**: Schools were required to have access to electronic devices, such as computers or tablets, to facilitate students' participation in the digital activities of the pilot program.
2. **Connectivity to the Internet**: Reliable internet connectivity was considered essential for accessing and completing the online exercises.
3. **Teachers' interest and willingness to participate**: Schools where teachers expressed enthusiasm and a commitment to implementing the pilot were prioritized.

Participation overview

Initially, **20 schools** from different regions of Argentina were selected to participate in the pilot. However, only **16 schools** actively participated, highlighting challenges in sustaining engagement or meeting the necessary conditions for implementation.

Challenges in selected schools

Although the schools were selected based on their possession of electronic devices and internet connectivity, practical implementation revealed significant disparities in resources:

- **Limited equipment**: Many schools did not have sufficient devices for all students, despite meeting the initial selection criteria. This shortage often resulted in students using their own devices, predominantly mobile phones, to complete the tasks.

- **Inconsistent internet quality**: The quality of internet connectivity varied widely, with some schools facing disruptions that hindered students' ability to complete online activities.

These challenges underscore the disparity in resource availability even within selected schools that met the baseline criteria.

Table 1: Devices used during the pilot

Device	Portion
Android	72.10%
iOS	2.55%
Windows	16.49%
Mac	2.55%
Linux	6.31%
Mobile	74.6%
Desktop	25.4%

According to the data from the Eduten platform, most students used a mobile device (tablet or a phone) to access the platform. Only one fourth of the exercises were completed on a computer. Android devices seem to be the most popular.

Control schools selection

In addition to the treatment group, **14 control schools** were included in the pilot. However, the control group faced significant issues with participation. Only **5 out of 14 control schools** completed both the pre-test and post-test, leading to a considerable reduction in usable data for analysis.

Data collection and participation

The number of student responses at each stage of the study reflects the logistical challenges of coordinating the pilot. The pilot was conducted at the end of a school year, which is typically very busy for schools. This might be one reason for the high dropout rate.

Table 2: Participant counts for pre-test and post-test by group

Group	Pre-test N	Post-test N
Treatment	387	418 (106 discarded for not completing the pre-test)
Control	648 (478 discarded due to not completing the post-test)	266

To ensure the validity of the analysis, responses from schools that did not complete both the pre-test and post-test were excluded. Additionally, individual student responses were discarded if the school name was not written in a recognizable manner, further reducing the dataset.

Test

The test used in both the pre-test and post-test phases was identical, consisting of six questions with a maximum score of six points. It was designed by Inet and Matic Soluciones Educativa, a team specializing in mathematics education, to assess students' understanding of equations and functions. The test aimed to provide a straightforward measure of student performance before and after the intervention, ensuring consistency in evaluation. Conducted via Google Forms, the test allowed for efficient administration across participating schools, making it accessible to students using various devices. The simplicity of the test design ensured ease of use while focusing on fundamental mathematical concepts, though the limited number of questions may have constrained the ability to capture a broader range of skills or nuanced improvements.

Survey

After the completion of the study, a post-study survey was conducted with teachers from the treatment schools to gather their perspectives on using the Eduten platform for mathematics instruction. The survey aimed to map their attitudes, opinions, and overall experiences during the six-week intervention.

Teachers were asked about various aspects of the platform, including its ease of use, the engagement levels of their students, and its perceived effectiveness as a teaching tool. The survey also explored any challenges they faced during implementation, such as technical issues, integration with traditional teaching methods, or time constraints. Additionally, teachers were invited to share qualitative feedback on how Eduten influenced their teaching practices and student outcomes.

The insights gained from the survey provided valuable context to the quantitative results of the study, highlighting both the strengths of the platform and areas that could be improved. These responses are critical for understanding the practical implications of adopting Eduten in real-world classrooms and for guiding future iterations of the platform.

Results

This section presents the findings of the pilot study, which aimed to evaluate the impact of the Eduten platform on student outcomes in mathematics across selected schools in Argentina. The results are derived from pre-test and post-test evaluations conducted with both treatment and control groups, allowing for a comparison of progress over the study period.

The study was conducted under real-world conditions, which introduced several logistical challenges, including variations in resource availability, internet connectivity, and levels of participation across schools. These factors influenced the data collection process and are important considerations in interpreting the results.

Table 3: Descriptive statistics

	Treatment		Control	
	Pre	**Post**	**Pre**	**Post**
N	387	418	648	266
Mean	4,12	4,80	4,21	3,97
Median	4	6	5	4
St.dev	1,67	1,57	1,80	1,76

All measurements are strongly skewed toward the higher end, indicating that many students achieved high scores. Consequently, the Mann-Whitney U-test was utilized to analyze the results. The comparison between the pre-test scores of the treatment and control groups revealed no statistically significant difference ($p = 0.1526$; $p > 0.05$). However, the control group's average performance declined over time, a result that was statistically significant ($p = 0.043$). Additionally, the difference in post-test scores between the treatment and control groups was statistically very significant ($p < 0.001$).

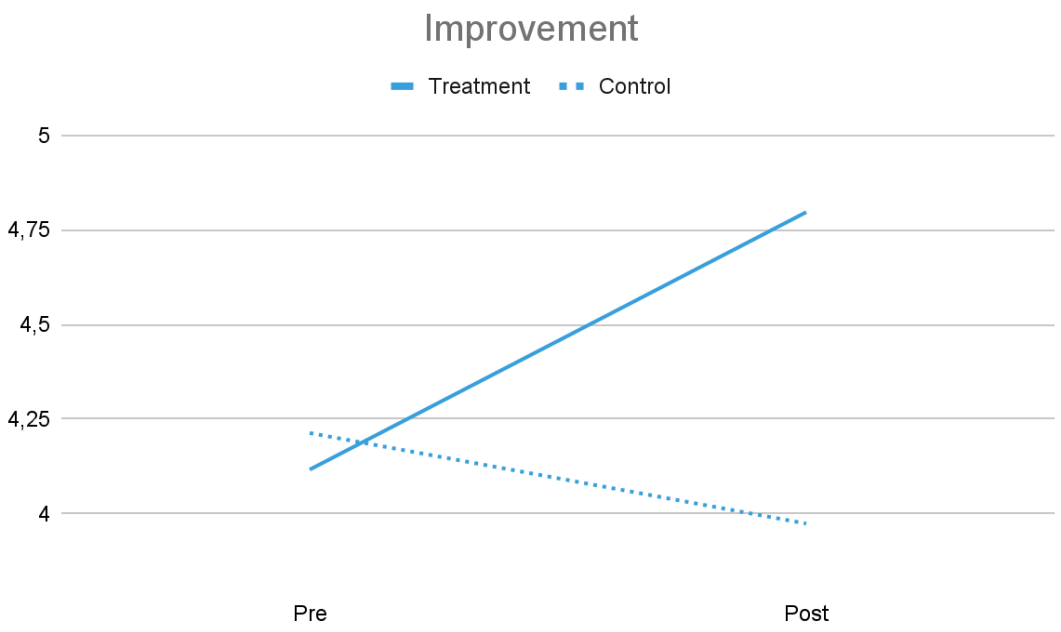


Figure 2: The pre- and post-test visualized for treatment and control groups

The improvement of the treatment group is clearly visualized in figure 2. The difference in the trends is very pronounced indicating a positive impact from the treatment. The treatment group demonstrated an improvement of 0.68 points, representing a 16.5% increase, while the control group experienced a decline of 0.24 points, equating to a -5.7% change. This results in a 22.2 percentage point difference between the two groups.

Limitations

The findings of this pilot study must be understood with some important limitations in mind, which affected the data collection, analysis, and interpretation. One major challenge was the inability to match individual student responses between the pre-test and post-test. Ideally, the analysis would include only students who completed both tests, providing a clear and consistent comparison. To address this issue, we only included schools that completed both tests in the analysis. However, this led to a significant reduction in the dataset, with many data points being lost. This high dropout rate may have impacted the reliability of the results and limits how widely the findings can be applied.

Another limitation came from the design of the exam, which had only six questions with a maximum score of six points. From the start, many students scored highly in the pre-test,

creating a strong skew toward the top end of the scale. This "ceiling effect" made it difficult for students to show further improvement, especially those who already performed well. As a result, the full impact of the intervention might not be clearly visible in this data, as there was little room for measurable growth in scores.

An unexpected result was the decline in the control group's performance from the pre-test to the post-test. This could be due to the large difference in participation between the two testing phases, which likely introduced bias in the sample. The high dropout rate among control schools, along with changes in the group of participants, makes these results harder to interpret. These challenges highlight the difficulties of conducting large-scale studies in real school settings. Despite these issues, the findings offer useful insights into the potential impact of the program and point to areas that can be improved in future studies.

Pilot activity

Overview of the pilot activity

This section highlights the key activity metrics demonstrating how effectively the Eduten platform was integrated into the pilot schools. By examining student engagement, goal achievement, and time spent using the platform, we aim to showcase its success as a practical tool for both teachers and students.

The analysis focuses on four key metrics: **learning index**, **student activity levels**, **bronze trophy achievements**, and **time on task**.

The **learning index** is calculated based on overall student activity, their ability to fulfill goals (achieve trophies), and accuracy. It provides an estimate of the potential for improving math learning outcomes for a class. The remaining metrics offer additional insights into platform usage and engagement: **student activity levels** measure the percentage of students actively using the platform each week, **bronze trophy achievements** reflect how many students met their weekly goals, and **time on task** captures the average time students dedicated to practice. Together, these metrics illustrate the platform's role in supporting math practice both in the classroom and during independent study, as well as its potential to enhance learning outcomes.

Together, these metrics illustrate how the platform supported regular math practice both in the classroom and during independent study, as well as its potential to enhance learning outcomes.

The pilot program spanned **6 weeks**, involving **16 schools** and **687 students**. On average, students spent **35 minutes per week** actively working on the platform, demonstrating steady usage. The platform's **bronze trophy goal** (an indicator of completing the weekly target) was achieved by an average of **33% of students**.

Learning index

The learning index combines key metrics—student activity, goal achievement (trophies), and accuracy—into a single measure that predicts the potential impact on learning outcomes. A higher learning index suggests a greater likelihood of students achieving improved results compared to traditional learning methods. Specifically, a value above 15 indicates a strong probability of enhanced learning outcomes, while a value of 0 predicts

no significant improvement. This internal Eduten metric is grounded in previous research and calibration studies (e.g., Kurvinen, 2020).

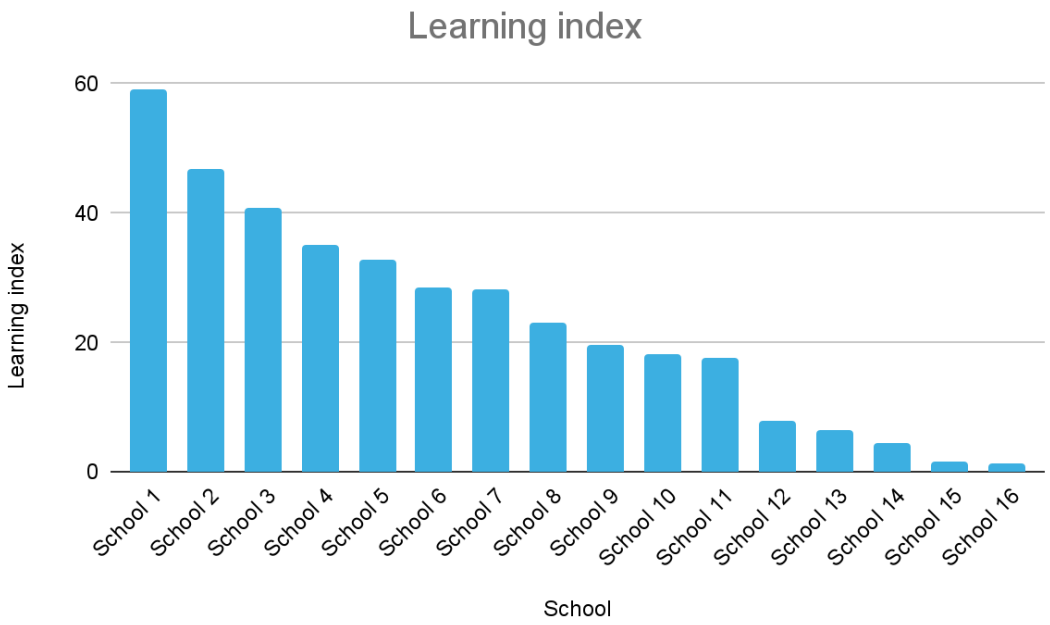


Figure 3: Learning index across schools

The schools are ranked in descending order based on their learning index, and this same order is maintained across the charts for other metrics. Only five schools fall below the recommended minimum learning index of 15, while the highest-performing school achieves a score of 59.

Weekly student activity

A student is considered active if they complete at least one exercise on the Eduten platform during the week. The minimum target for implementation is defined as **50% weekly activity**, with a good level considered to be **80% or more** of students actively participating each During the first two weeks of the pilot, student activity was below the recommended minimum of 50%. However, activity levels began to improve by the **3rd week**, reaching nearly **80%** in both the **4th and 6th weeks**. This progression suggests an initial adjustment period followed by a steady increase in engagement as students and teachers became more familiar with the platform.

The pattern of a slower start followed by increasing activity is a common observation during pilot implementations. The support provided by the Eduten team was instrumental in facilitating this transition and ensuring that activity levels approached the

recommended thresholds. This emphasizes the role of external guidance in achieving consistent engagement during the early stages of adoption.

Analysis of the hours during which students were active reveals a clear pattern. The majority of activity occurred between **8:00 AM and 12:00 PM**, aligning with typical school hours. There was moderate activity during the afternoon, from **3:00 PM to 6:00 PM**, suggesting that some students continued their work after school. Activity persisted until around **9:00 PM**, at which point it began to decline rapidly. Notably, there was no activity recorded between **3:00 AM and 6:00 AM**, as expected.

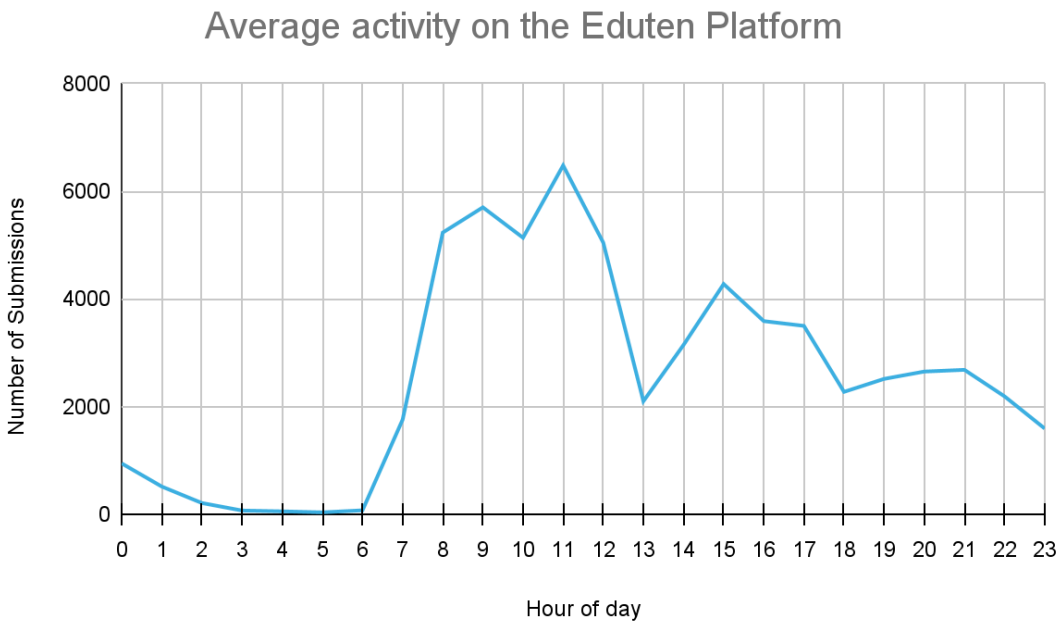


Figure 4: Hourly activity on the Eduten Platform

These patterns indicate that while most of the work is done during school hours, a portion of students are also engaging with the platform at home in the afternoons or evenings.

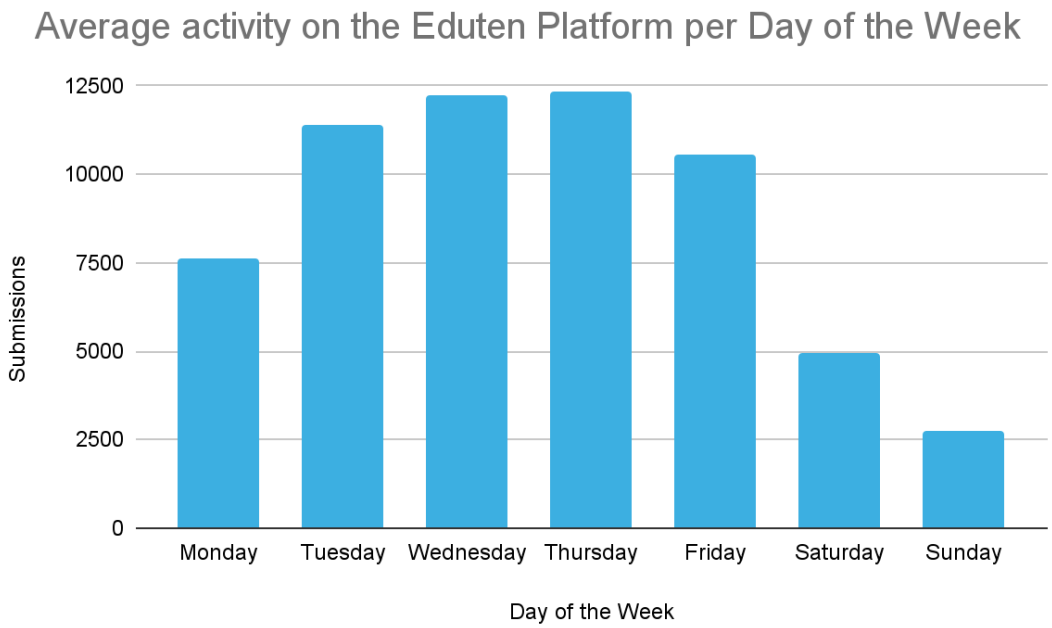


Figure 5: Weekly activity trends on the Eduten Platform

When examining activity by day of the week, Tuesday through Friday showed consistent and balanced engagement. In contrast, lower levels of activity were observed on Mondays and weekends. This suggests that students are most engaged during midweek, possibly due to established school routines and teacher-led sessions during these days. The lower activity on Mondays could be explained by the fact that most teachers use the content for revision.

Time on task

Time on task measures the average time each student spends on the platform weekly, providing insight into the balance between workload and learning engagement. The recommended minimum is **30 minutes per week**, while **60 minutes per week** represents a good level of usage. Across the six-week pilot, the overall average was **35 minutes per week per student**, slightly above the minimum recommendation.

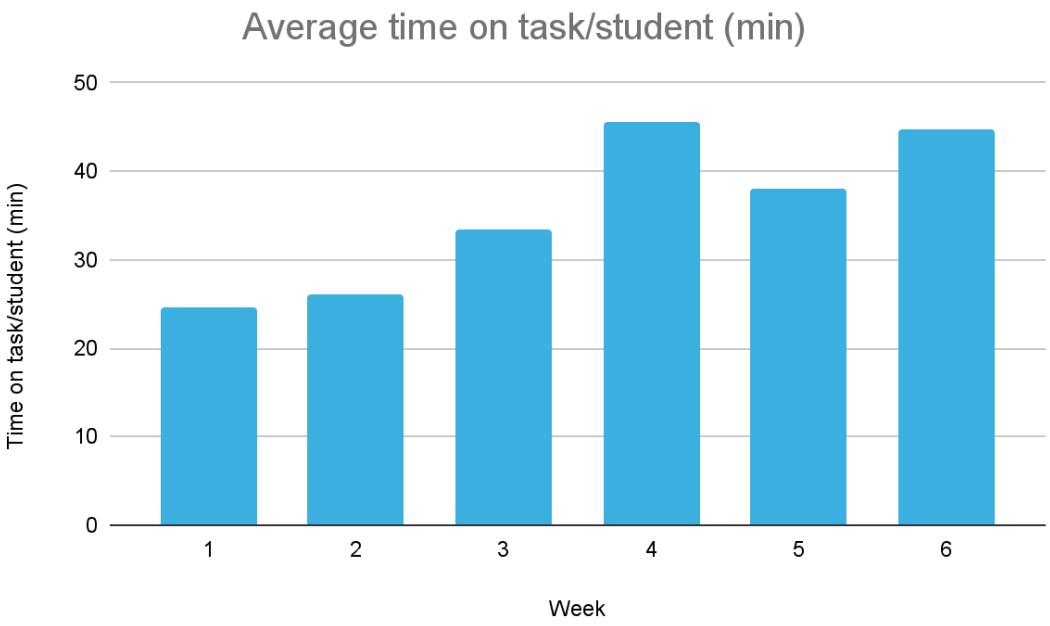


Figure 6: Weekly average time spent on tasks per student

The trend in average time on task closely mirrors that of student activity. In the early weeks, the average time fell below the recommended minimum, but by **weeks 4 and 6**, it increased to approximately **45 minutes per week per student**. This upward trend suggests improving familiarity and engagement with the platform as the pilot progressed.

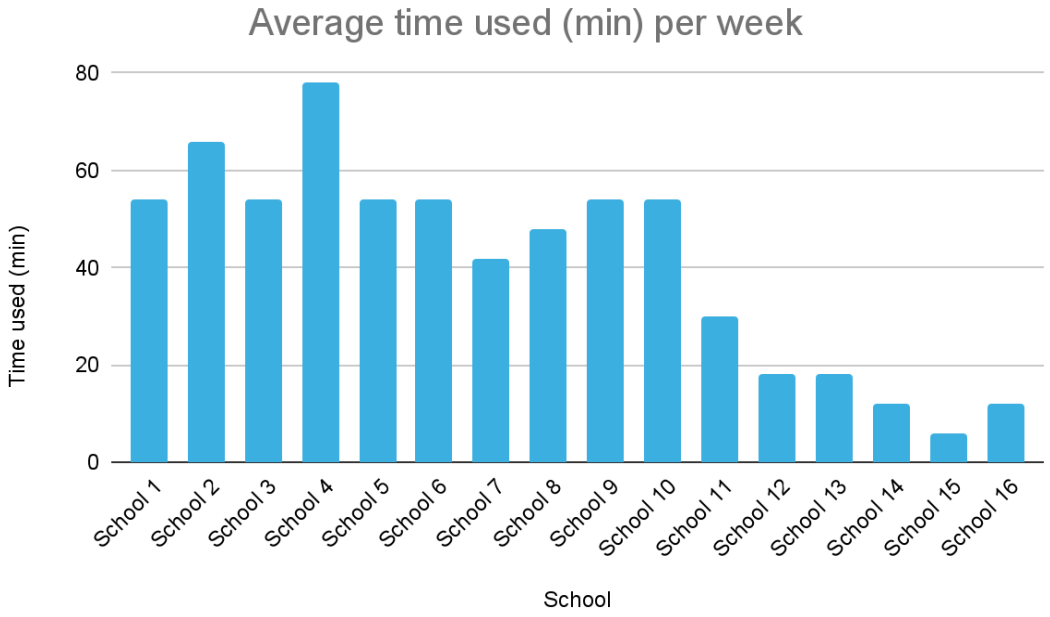


Figure 7: Average weekly time spent per school

When examined at the school level, there was significant variation in average time spent. The highest average time was **78 minutes per week**, while the lowest was **6 minutes per week**. Notably, six schools recorded an identical average of **54 minutes per week**, which

approaches the "good" level of engagement. However, five schools did not meet the recommended **30-minute minimum**, indicating some variability in implementation across schools.

These findings highlight the importance of consistent engagement strategies to achieve equitable usage across all participating schools.

Weekly Goal Achievement

The bronze trophy represents the minimum weekly goal for students. To achieve a bronze trophy, a student must complete at least **50% of the exercises** provided in a lesson. Typically, students begin working on these exercises at school and continue at home until the goal is achieved.

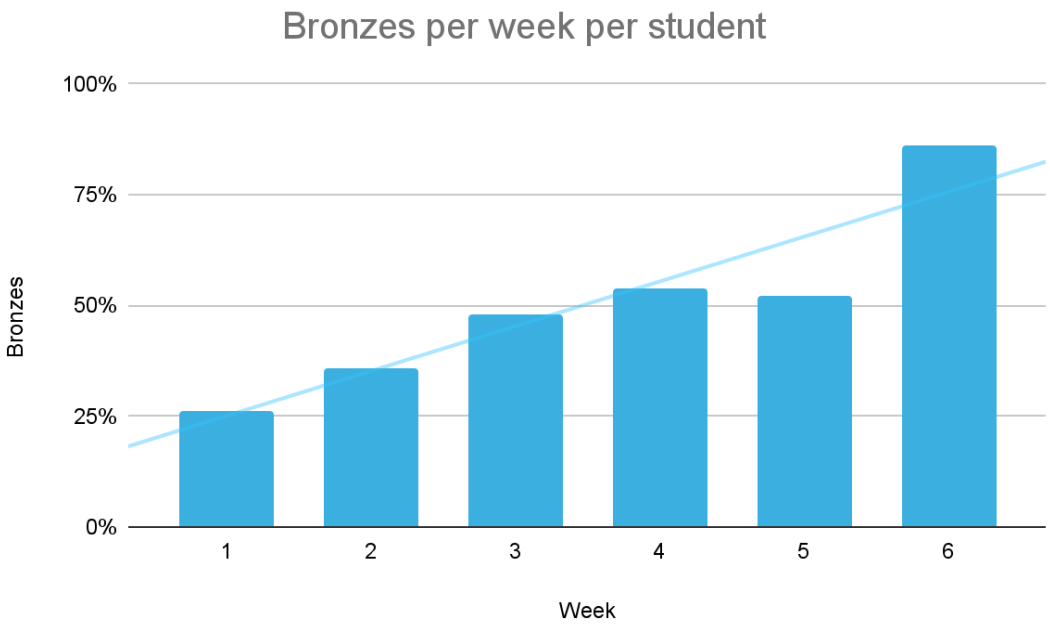


Figure 8: Weekly bronze achievements per student

The recommended minimum is for **50% of students** to meet this goal each week. During the pilot, the percentage of students achieving the bronze trophy started low, at around **25%** in the first week. By the **third week**, the average across all schools approached **50%**, maintaining this level until the final week, where there was a significant increase to **86%**. This significant increase indicates a focused effort by students and teachers during the final phase of the pilot.

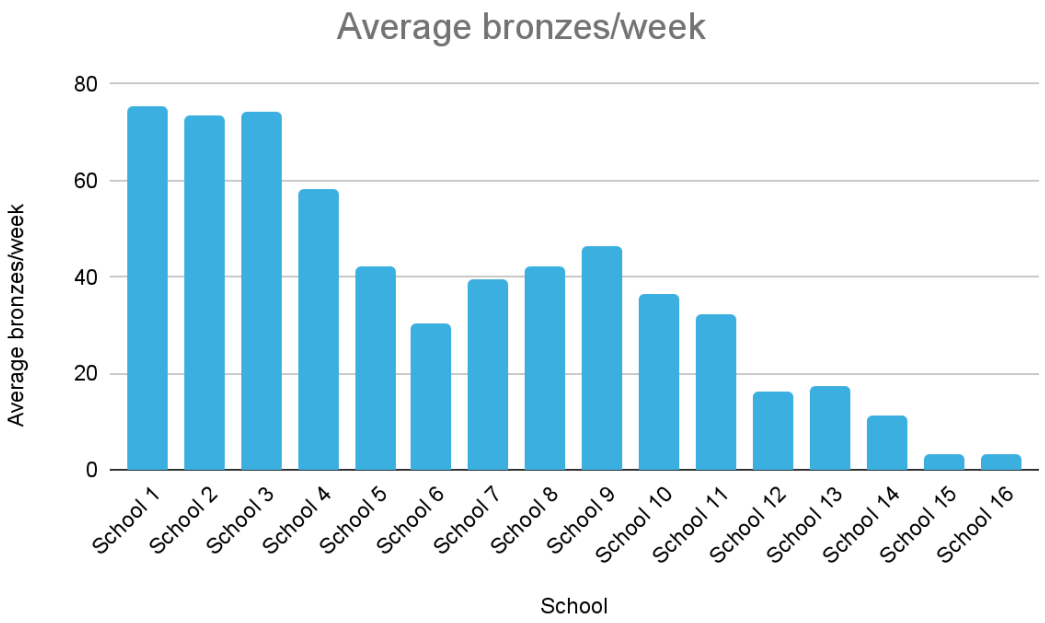


Figure 9: Average weekly bronze trophies by school

There is a lot of variation in the tendency to reach the weekly goals from school to school. Three schools demonstrated particularly high performance, with average weekly bronze trophy achievements exceeding **70%**. Only four schools achieved an overall average of more than **50%** for the six-week pilot. While these results are promising, they highlight a clear area for future improvement in supporting students to consistently reach their weekly goals.

Survey

In addition to assessing student learning performance, a survey was conducted to explore the opinions, attitudes, and experiences of teachers regarding digital learning and pedagogy. The survey aimed to gather insights into their perspectives on using Eduten as part of their teaching practice. Of the 16 treatment schools piloting Eduten, a total of 22 responses were collected, providing valuable qualitative data to complement the quantitative findings of the study. A larger number of teachers' responses in relation to the number of schools participating was that in some schools there were two groups participating in the pilot. This feedback offers a deeper understanding of the practicalities and challenges of integrating digital tools into mathematics education.

Most of the teachers (64%) were very experienced with over 10 years of experience in teaching.

The survey results are presented in table 4 showing the average answer in the range of 1-5 and the acceptance rate (ratio of answers 4 and 5).

Table 4: Survey results

Question	Average	Acceptance rate
¿Se siente cómodo utilizando la plataforma Eduten para la enseñanza?	4.7	96%
¿En qué medida lo ha preparado la capacitación para utilizar Eduten?	4.6	96%
¿Cree que la plataforma Eduten es eficaz para la enseñanza y el aprendizaje?	4.3	86%
¿Cómo calificaría su experiencia con la plataforma Eduten?	4.5	91%
¿Cómo calificarías las habilidades tecnológicas de sus alumnos en la plataforma Eduten?	4.0	73%
Por favor, comparta sus opiniones o experiencias sobre la actitud de los padres hacia el uso de Eduten.	3.4	54%
¿Cuál es la velocidad y disponibilidad de Internet en su centro?	3.0	32%
¿Hasta qué punto son suficientes los ordenadores y equipos de la escuela para la plataforma Eduten?	2.3	18%
¿Qué tal fue el apoyo de la dirección de su centro a la hora de adoptar la plataforma Eduten?	4.5	86%
¿Cuál es la eficacia de la plataforma Eduten para mejorar la enseñanza de las matemáticas?	4.5	90%
¿En qué medida se ajusta la plataforma Eduten al plan de estudios de matemáticas (curriculum)?	3.8	68%
¿Hasta qué punto la plataforma Eduten involucra y motiva a los alumnos en el estudio de las matemáticas?	4.1	77%
¿En qué medida fomenta la plataforma Eduten el aprendizaje autónomo de las matemáticas?	4.2	77%
¿En qué medida ha sido útil el análisis del aprendizaje en Eduten?	4.3	90%
¿En qué medida ayuda la plataforma Eduten a reducir la carga de trabajo de los profesores?	3.9	72%
¿Es partidario de una mayor adopción nacional de esta plataforma?	4.5	81%
¿Cumplió Eduten las expectativas que tenía puestas en ella?	4.6	96%

Overall, teachers expressed a high level of satisfaction with the platform and the teaching and learning experience it provides. The average rating for their experience with Eduten was 4.5, with an acceptance rate of 91%.

The lowest ratings from teachers were related to infrastructure, specifically the availability of computers and the quality of internet connectivity. This underscores the critical need to improve school infrastructure to enable the effective and sustainable implementation of digital pedagogy.

Teachers noted that parents' attitudes were, on average, neutral, though there was some variation. This variation is likely linked to the reliance on students using their own devices, as many schools were unable to provide adequate tools for digital learning. This reliance may have contributed to some level of concern or hesitation among parents.

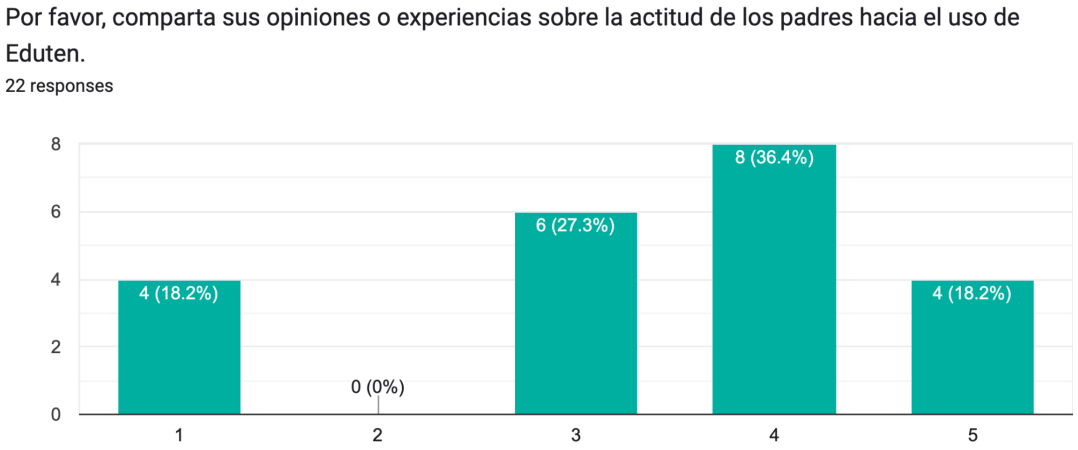


Figure 10: Parent attitudes toward Eduten usage

The survey responses indicated that future implementations of Eduten should focus on improving curriculum alignment, which received an average rating of 3.8 and an acceptance rate of 68%.

There was slightly more variation in responses related to independent learning and student motivation. The question on student motivation received an average rating of 4.1 with a 77% acceptance rate, while the question on encouraging independent learning had an average of 4.2 with the same acceptance rate.

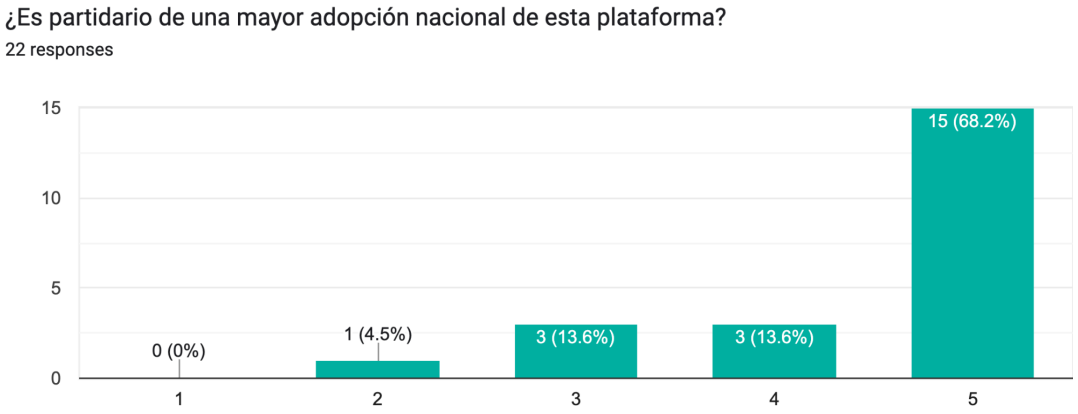


Figure 11: Support for nationwide adoption of the platform

When asked about their support for a broader national adoption of Eduten, teachers gave an average rating of 4.5, with an acceptance rate of 81%. These results suggest overall positive attitudes toward scaling up the use of the platform while highlighting areas for further enhancement.

To further understand the attitudes of the teachers, there are a few quotes below. The first two are very positive and the teachers clearly had enjoyed the pilot experience and understood the pedagogy behind Eduten. The third quote shows the importance of curriculum alignment, timing and support for teachers to be successful. There are excellent lessons to be learned from these quotes.

1. *Eduten has allowed me to visualise mathematical activities that I could also do manually in a playful way. The platform led the students to compete with each other in a healthy way to solve more exercises and to reach the diamond or at least a trophy. Parents participated by helping them at home with the activities. Finally, Eduten allowed them to learn through mistakes how to solve function exercises for example. It was a new topic, which was rarely seen, and thanks to eduten they learned a lot. Just yesterday they asked if they had to enter the platform, but the pilot test was finished. It was very rewarding and helped a lot in an entertaining way.*

2. *The use of the Eduten platform had a positive impact on the teaching and learning of the students. Through its use, the students were able to incorporate new contents in less time than stipulated, achieving independence in the resolution of exercises, developing critical and deductive thinking, reinforcing the relationship with their peers through the debate on the results obtained, among others. A positive attitude was also observed in those students who were somewhat*

reluctant to work in the area, who, through the resolution of playful activities and the incentive to win the most trophies, were able to successfully achieve the objectives set by the teacher.

3. *I felt that the platform produced a generalized anxiety in the students, like the one that comes from having notifications on the phone without looking at them (I think that was why those who got hooked a lot, they were anxious about not having all the bars for the exercises and the complete lessons, in green). It also happened that there were students who are very participative and active in class who did not engage with the platform's exercises and that lowered their level in class and their attention.*

   Regarding the imposed implementation, the timing seemed quite inappropriate to me, the end of the year is a very particular and complex moment for the school year, whoever works in education knows this.

   I also felt that by homogenizing the contents and determining them arbitrarily, I had to modify the planning of this year in which we worked with the platform to be a mere executor, I personally looked at the lesson exercises one by one and anticipated which were the concepts that they should know and which were the possible inconveniences that could arise, without being able to incorporate the contents gradually, with a logical didactic sequence and in accordance with my students.

   40 minutes of work with the platform is not enough to achieve 1 weekly trophy.

   Yes, it was fun that the activities were games, it was noticeable in those who were excited that they asked for more lessons and students from other years approached to ask if their course would also use it.

The third feedback offering constructive criticism serves as an important reminder of the demanding schedules teachers face. The timing of the pilot added extra pressure, which likely contributed to some schools being unable to complete all the tests. This feedback also underscores the need for high-quality curriculum alignment with the provided content to reduce teachers' workload rather than adding to it. The teacher's observation about the challenge of achieving a trophy within 40 minutes a week, especially for all students, is valid. This limitation is why some of the activities are designed to be completed as homework, providing additional opportunities for students to reach their goals.

The survey results show that teachers were generally very satisfied with the Eduten platform and its potential for enhancing math education. However, challenges such as limited school infrastructure and curriculum alignment were noted as areas for improvement. Teachers valued the platform's ability to support independent learning and motivate students but highlighted the importance of reducing their workload by better integrating the content with the curriculum. Despite these challenges, there was strong support for the wider adoption of Eduten, reflecting its overall positive impact on teaching and learning.

Conclusions

Despite the challenges and the timing of the pilot, the study demonstrated clear improvements in students' math performance as a result of using the Eduten platform. The testing results highlighted the platform's potential to enhance learning outcomes, even in diverse and sometimes less-than-ideal conditions.

Activity levels on the platform varied significantly among schools. While some schools demonstrated high engagement and consistent use, others showed moderate or lower levels of participation, indicating a wide range of implementation practices and potential barriers to consistent usage.

The teacher survey revealed strong overall support for the Eduten platform and digital pedagogy. Teachers appreciated its impact on student learning and engagement but emphasized the critical need to address infrastructure challenges, particularly access to devices and reliable internet connectivity. These obstacles remain the most significant barriers to scaling the implementation of Eduten and similar digital tools across a broader range of schools.

In conclusion, the study underscores the promise of Eduten as an effective digital learning tool while highlighting areas for improvement, particularly in infrastructure and support, to ensure its broader and more consistent adoption.