Levebee🐝

Math Without Barriers

2024 Report

Executive Summary

The Math Without Barriers project provided digital early math diagnostic assessment to over **1,100 schools** with **25,000 first grade students** across the Czech Republic, which covers **25 % of all** first-graders in the country. **97 %** of participating teachers recommend Levebee to other teachers.

Addressing hidden gaps in math skills at the beginning of first grade ensures that students can effectively grasp new concepts and enjoy math from the start of their schooling. The project helped prevent early failure experiences for students, supported a more enjoyable learning environment, and helped teachers and policymakers improve the education system.

The data collected will help national educational institutions, such as the Ministry of Education (MŠMT) and the National Pedagogical Institute (NPI), to understand children's abilities at the beginning of their formal education. This initiative has also contributed with relevant data to the discussion on a smoother transition from preschool to primary education.

PROJECT DURATION
September - October 2024

MAIN ORGANIZER
Levebee

Participants

One in four first graders in the Czech Republic took a diagnostic assessment for early numeracy using the Levebee.

1,100 schools participated in the project

**25,000** first-grade students completed the diagnostic assessment

25 % of all first graders in the Czech Republic were included

Schools participating in the project were equally distributed across the country:
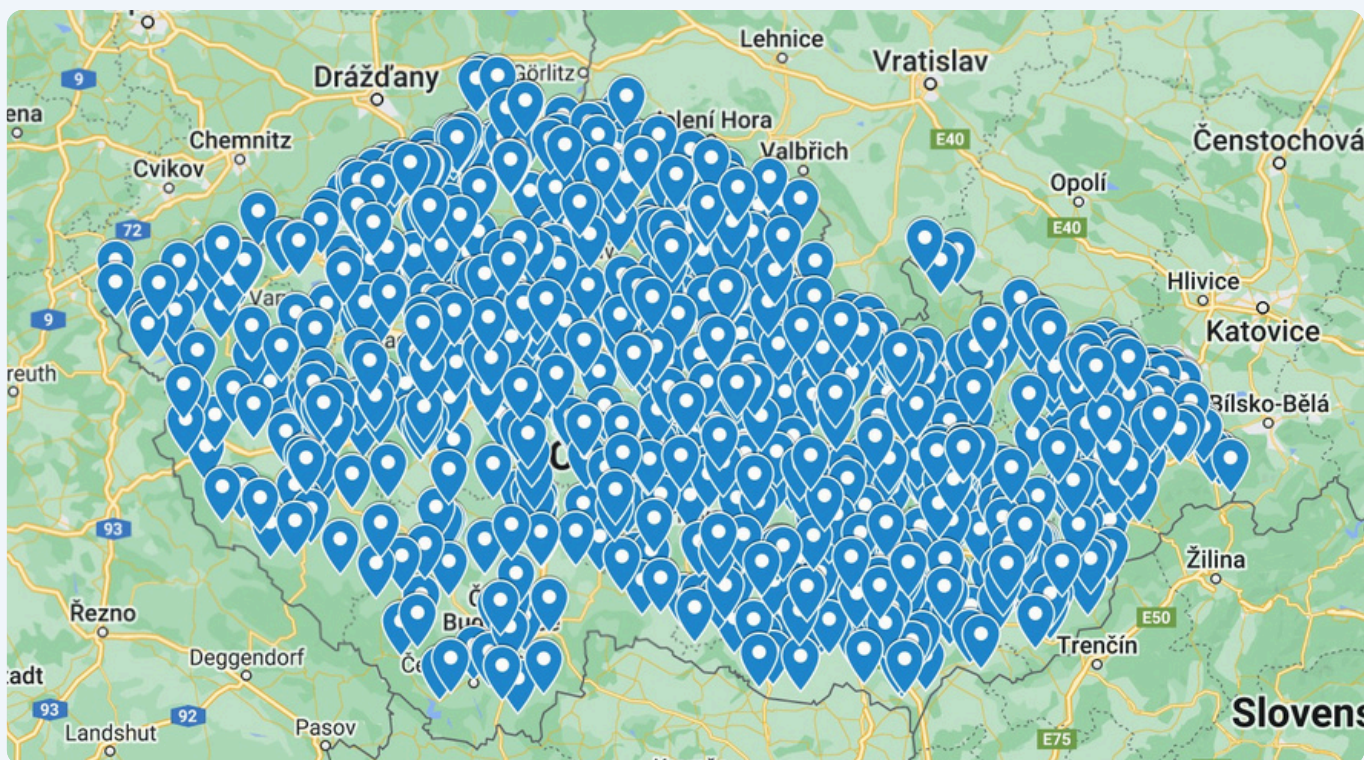
Pedagogy

Levebee diagnostic assessment is based on our research into **early math skills dependencies.** This allows us to make the assessment **adaptive** and therefore fast, identify **root causes** and make predictions about **future struggles**.
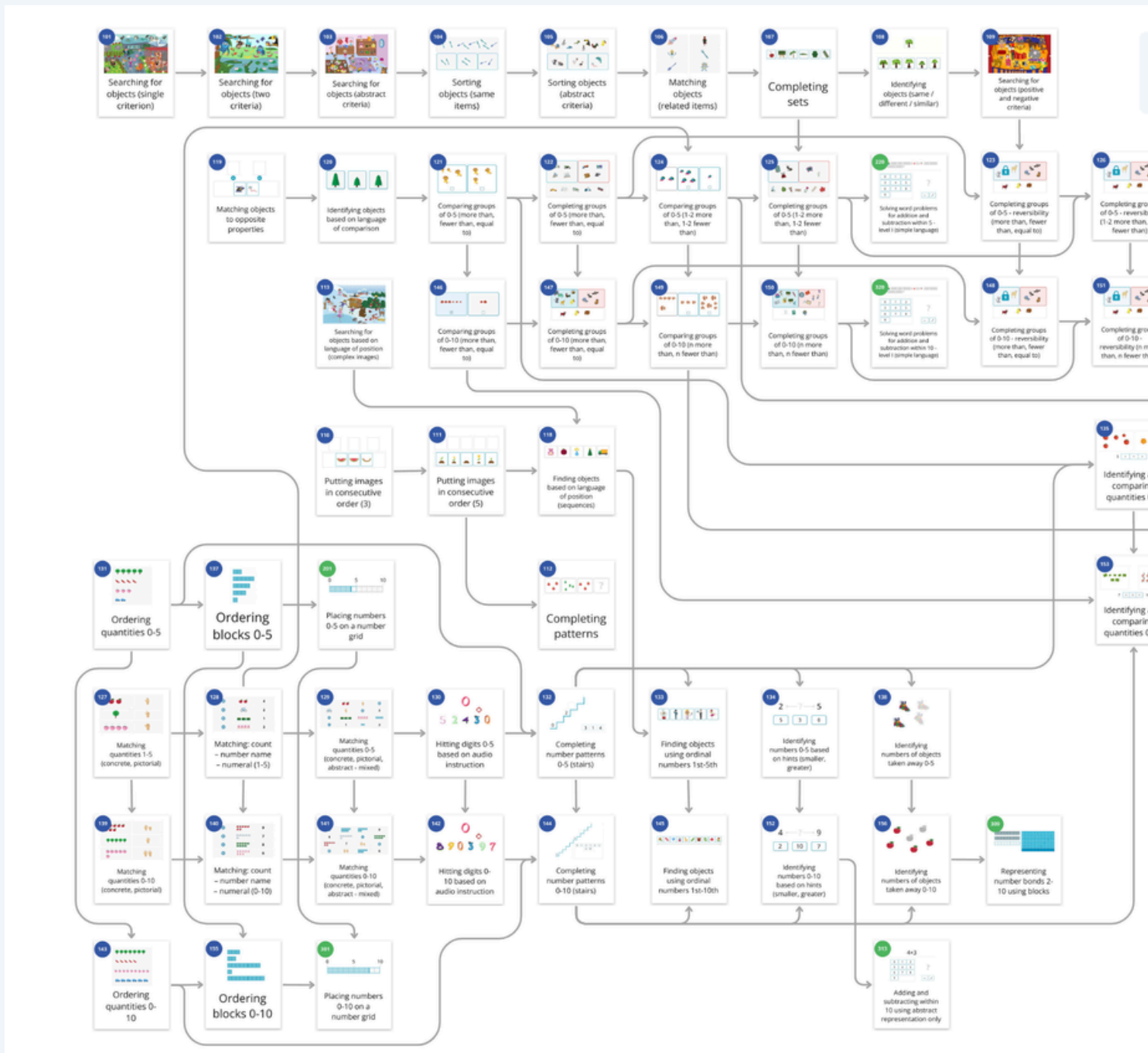
Logistics

Levebee is designed to be accessible even for kids with special needs, allowing them to complete the assessment in an average of **23 minutes** with **minimal assistance**. This allows teachers to take the diagnostic assessment with the **whole class at once** on existing school devices.
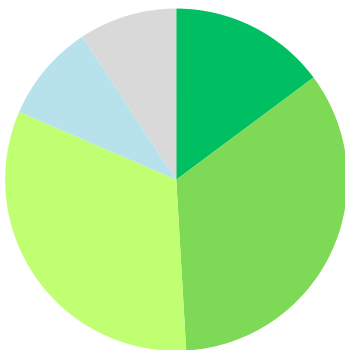
Did students complete the assessment without assistance from a teacher?

- Yes, completely (16 %)
- Yes, almost completely (37 %)
- Exceptionally needed help (35 %)
- Needed help frequently (9 %)
- Other (3 %)

March-July	August	September-October	November →
Signing up schools	**Teacher Training**	**Diagnostic assessment in schools**	**Data Analysis**

Average duration

23 min

per student

Outputs for Teachers

Each teacher received a **detailed report** for each student as well as a **summary for the entire class**. The report is written in a simple language understandable even to teachers **without math pedagogy background.**

Excerpts from the class summary

ESSENTIAL: What to prioritize

> ⚑ Although the student demonstrated a partial **understanding of numbers and the number range 1-5**, they were unable to **compare the number of objects** using the concepts of **n more than / n fewer than** in **1-5** range. This will limit them in learning numerical operations and solving word problems.
> More ↓

38% = 🧑 🤸 🦎

Tobias

DESIRABLE: What to consider teaching

> ⚠ The student is partially ready to understand numbers and numerical operations, but needs to become more **fluent in counting the number of missing objects up to 5**. This will help them in the future when learning addition and subtraction. More ↓

50% = 🦢 🐹 🐭 🐱
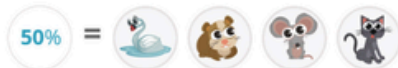
MASTERED: What students can already do

> ☑ The student is ready to understand **numerical operations** in **1-5** range. More ↓

38% = 🧑 🤸 🦎

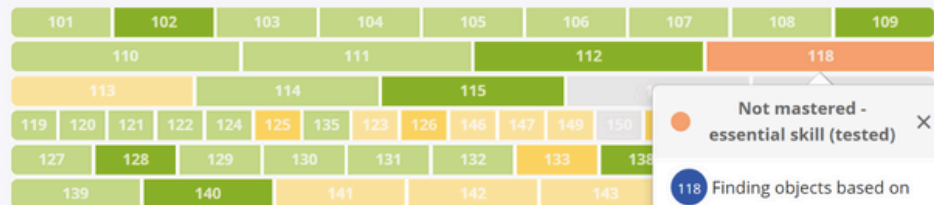# Excerpts from an individual student report

Skill overview

Grouping	101	102	103	104	105	106	107	108	109
Arrangement	110		111		112		118		
Spatial awereness	113		114	115					
Comparision 0-5	119 120 121 122 124	125 135 123 126 146 147 149 150							
Numbers 0-5	127 128 129 130 131 132 133 138								
Numbers 0-10	139 140 141 142 143								

Legend:
- ⚪ Not tested.
- 🟢 Mastered (tested)
- 🟩 Probably mastered (not tested)
- 🟠 Not mastered - essential skill (tested)
- 🟡 Not mastered - desirable skill (tested)
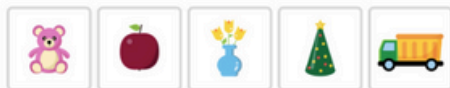- 🟨 May not have mastered (not tested)

Not mastered - essential skill (tested) ✕

118 Finding objects based on language of position (sequences)

🧸 🍎 💐 🎄 🚚

More information about exercise

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② How to help the student

118 Finding objects based on language of position (sequences)

🧸 🍎 💐 🎄 🚚

⭐☆☆ 54 %

🥴 STUDENT'S OPINION :
Too hard

⏰ 0 s

The student has not completed this exercise to the required level.

What may be the cause?

⚠️ The student's **understanding of terms related to relationships within sequences**, such as 'after', 'right after', 'before', 'right before', 'between', and others, appears to be **limited**. This suggests that they may also struggle to comprehend concepts such as 'far', 'close', 'by', 'above', 'below', and so forth.

⚠️ The student is **not prepared to grasp the connections between numbers**.
For instance, to identify the number right after 2, all numbers after 2, or all numbers between 1 and 5.

What may help this student?

💡 **Explain the spatial arrangement of objects.** Use terms such as 'near', 'distant', 'behind', 'inside', 'by', 'next to', 'between', 'in the middle', and so on.
For example, say, "What object am I thinking about? My object is located in this room between ... and hanging above ..."

💡 Verify that the student can successfully **navigate in a sequence of objects without relying on numbers**.
For example, make sure that the student can identify what comes after, right after, what is in between, next to, etc.

Impact

Both outcomes defined in the Logic Model of Levebee have been achieved.

1 The **number of students diagnosed for hidden gaps** in math skills **increased** from hundreds to 25,000.

This was measured by the number of students who completed a diagnostic assessment using Levebee. In previous years, it is estimated that early math diagnostic assessments were administered to at most a few hundred students in the Czech Republic due to the time commitment of the non-digital process.

INPUTS	ACTIVITIES	OUTPUTS	OUTCOMES	IMPACTS
Pedagogical experts and researchers	Researching math skill dependencies	**User-friendly app that allows teachers to:** Run a quick 20-minute diagnostic assessment with a whole class. Get pedagogical recommendations tailored to their class and individual students. Let students learn independently via fun & interactive exercises automatically adapted to their progress.	Increased number of students **diagnosed for hidden gaps in math skills**	Increased number of children leaving primary school with **strong numeracy skills**
Product designers and developers	**Developing math exercises** that can be used independently even by disadvantaged students		Increased number of **students who received personalized math support**	
Writers and graphic designers	**Writing pedagogical recommendations** understandable even to inexperienced teachers		Increased number of **teachers with strong understanding of their students and math pedagogy in general**	
Teacher trainers and user support	**Preparing and organizing** teacher trainings, providing support	Teacher training sessions		

2 Teachers' **understanding of their students and math pedagogy** has improved.

This was measured by surveying **1198 teachers** who completed the diagnostic assessment with their class. They were asked to describe what they had learned thanks to Levebee.

All the kids enjoyed the diagnostics. They had no feeling of failure even in tasks that were difficult for them. Most of them had no problems with numbers and with matching the number of elements. The concepts of before, after, between left-right, left-centre, etc. were problematic. This needs to be addressed. I will be working with the grid, working with number line, etc.

Dagmar, 1st grade teacher

The students were very motivated. They enjoyed working in the Levebee. A surprisingly large percentage of pupils had difficulty with the principle of ordering objects, forming groups of objects and comparing them, and handling the combination of negative and positive conditions. On the other hand, all pupils were able to understand the concepts 1-5 and most children mastered the orientation in a 3x3 grid. The summary of the diagnostic results is a great tool and inspiration for further work with children. I want to include similar exercises as warm-ups, activity learning.

Libuse, 1st grade teacher

A great tool for accurately mapping levels in particular areas and catching weaker children. I would never have gotten such an overview without this tool. I would really appreciate something similar for reading.

Jana, 1st grade teacher

I did not expect that a large percentage of students do not have anchored pre-math skills. They could recognise the numbers 1-10 but were not very good at determining the order, and how much more/less was one of the hardest tasks ever. Thanks to the diagnostics, I know we will have to spend more time on these skills than I anticipated. I'm going to spend a lot more time on pre-math skills and link math to other subjects so we can catch up.

Jana, 1st grade teacher

I was surprised by the result of the diagnosis for a very clever pupil in terms of logical thinking and numerical calculation. His results were very poor. I had no idea that he had not yet consolidated his knowledge regarding right-to-left orientation and navigation in a series with which he struggled a lot in first grade. I am considering purchasing headphones for more frequent and easier use of the app in the classroom.

Jitka, 1st grade teacher

The children enjoyed the tasks very much, some of them started with home practice. I know which areas to focus on more, lots of pupils had problems with the concepts of more about/less about, comparing the number of objects, mental representation of number series in the range 1-10 without visual support. I like the whole class summary.

Mirka, special ed teacher

Most of all, I appreciate that the diagnostics actually detect hidden gaps. The great thing for me as an educator is that I can see the ongoing results of the students. I can look at each student individually + your app itself will recommend exercises to remediate that area. Last but not least, I have to mention that the students were very enthusiastic about the assessment, they enjoyed learning on the iPads. I immediately incorporated activities into the lessons where the students were having the most difficulty.

Tereza, 1st grade teacher

The children were excited about the tasks. They enjoyed the interaction, liked the voice output - praise for completing the task correctly and encouragement in case of a mistake. The most difficult tasks were those where the children manipulated the pictures according to the instructions, e.g. "There will be two more in the red box than in the grey box"... Next - cards with different numbers - logical series. Then also where they labelled the pictures in a row - according to instructions - e.g. "Which pictures are between the two given pictures?"... "Which pictures are between the 7th and 10th picture?" They were mostly very good at linking numbers and counting, and were also good at placing the picture in the box as instructed - top x bottom x middle, RxL. We will practice the tasks regularly in school.

Oldriska, 1st grade teacher

Satisfaction Rates

97 % of teachers who have tried Levebee **recommend** it to others. This creates an opportunity to repeat the project next year and **start a time series** for a long-term research.

Would you recommend your colleagues to carry out a math diagnostic assessment via Levebee with first-graders next year?

Rather no
3%

Rather yes
34%

Definitely yes
63%
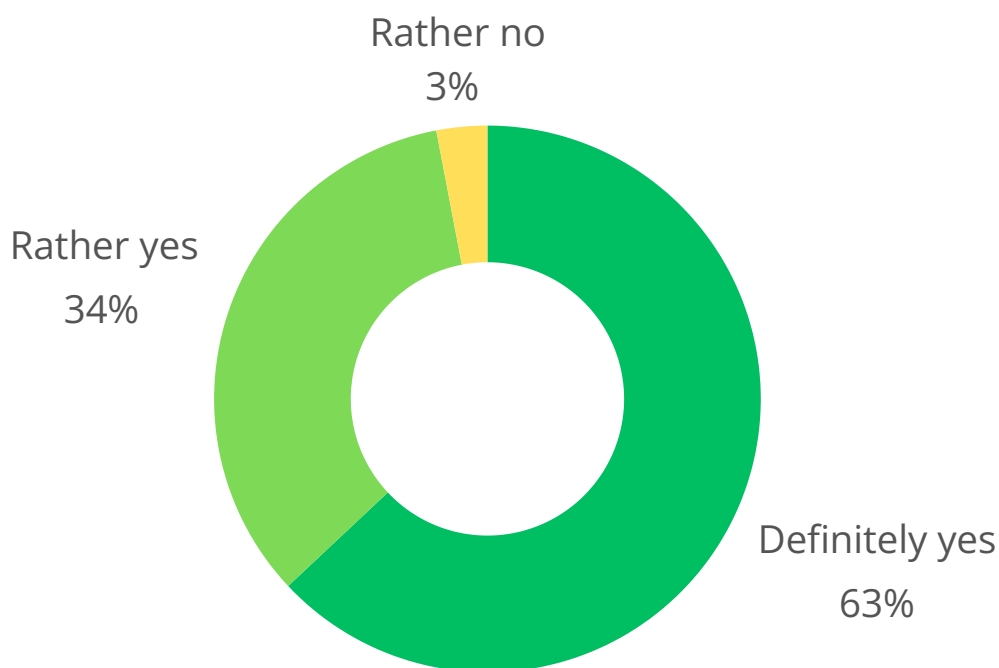
Survey conducted in October 2024 among **1198 teachers** who have completed early math diagnostic assessment via Levebee with their class.

Further Research

The data collected during the project allows **researchers** to answer a variety of questions about **school readiness, math education, inequality**, and more.

Levebee has partnered with the renowned research agency PAQ research. Together we will help answer questions such as:

- What skills do students really have when they enter elementary school?
- How does my school compare to similar schools?
- Are there significant differences between the initial skills of students in different regions?
- How do math skills develop over time?

Completed diagnostic assessments by day of the project

2000

0

Sep 1

Oct 18
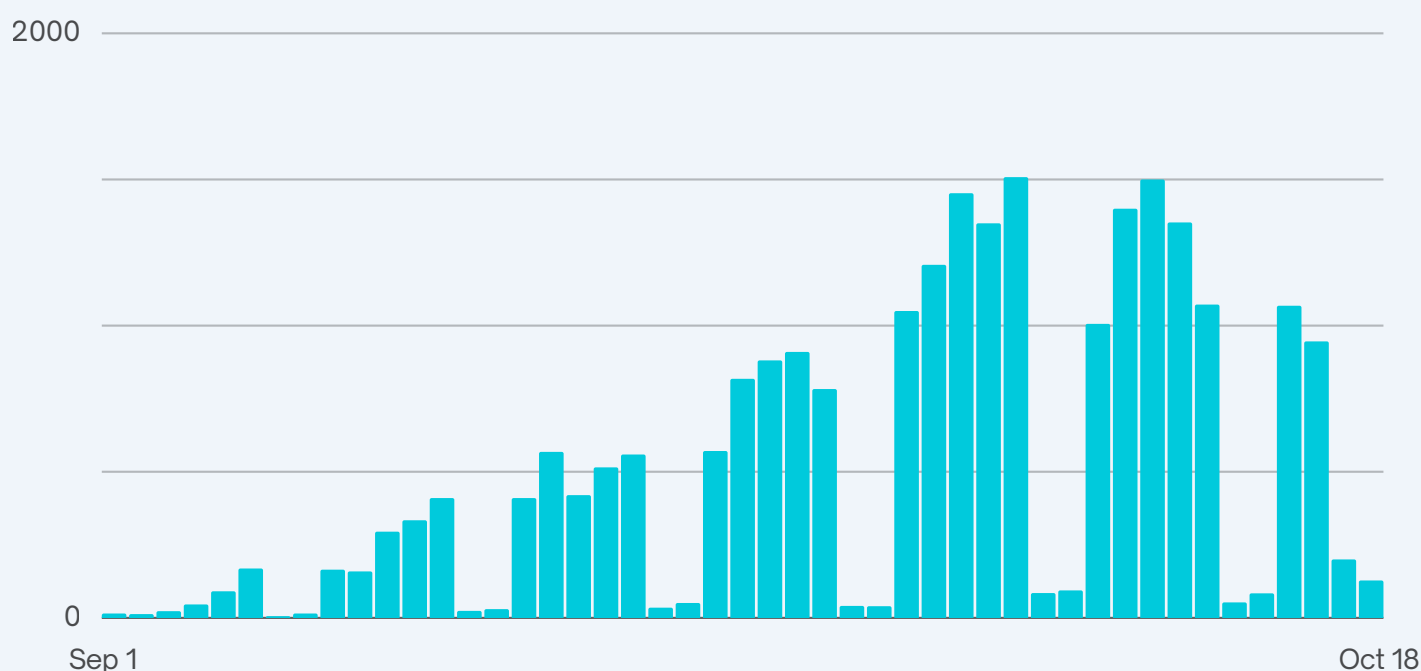
About Levebee

Levebee is **one of the most disruptive EdTech startups** and SMEs as selected by the IMPACT EdTech programme co-funded by the European Commission to boost innovation in education throughout Europe.

Since its inception in 2014, Levebee as an SME has been at the forefront of developing innovative tools for early education. The platform has gained widespread trust and recognition, currently being utilized by over **1000 schools** and engaging more than **500,000 students** in diverse learning experiences.

A key strength of Levebee is its **commitment to inclusivity and accessibility**. The app is designed to cater to students from various backgrounds and with different needs, including those with autism, ADHD, aphasia, and dual-language learners.

In classroom settings, Levebee serves a dual purpose: it is both a tool for **personalised maths instruction** and a **formative assessment** instrument. Beyond its immediate impact on teaching methodologies, Levebee collects datasets that are invaluable to the research community.

Levebee has received **recognition** over the years for its contributions to education technology. In 2014, it was a finalist at the TechCrunch Startup Battlefield in London. The Vodafone Foundation in the Czech Republic supported Levebee in 2015 for its social impact. It was among the top 8 finalists in the 2021-2022 IMPACT EdTech Accelerator's 3rd Open Call. More recently, in 2023, Levebee was a finalist in the MIT SOLVE LEAP Challenge in the USA, reflecting its continued growth and relevance in the global education landscape.

Thank you!

Thank you for taking the time to read this report. If you have any questions or would like to organise similar project in your country or district, please don't hesitate to reach out to us.

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