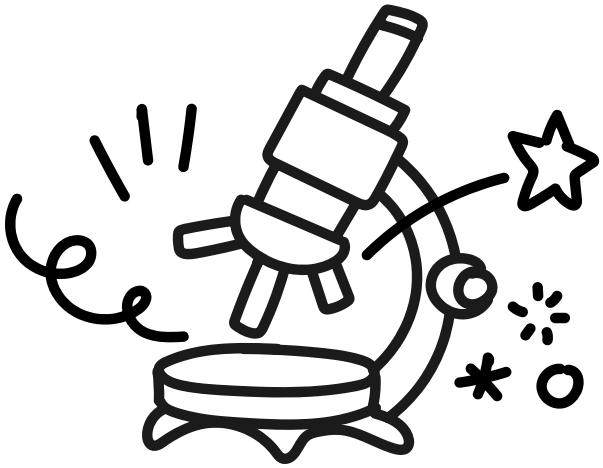
Innovamat

COSMOS

Initial assessment

Sample Class



Sample School

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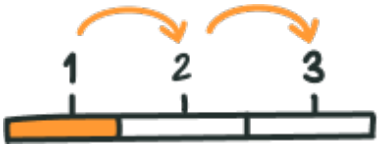
Introduction to the COSMOS Test and Intervention Program

This report collects and analyzes the **results of the initial COSMOS test**, a universal screening test [1] specially designed to assess students' basic math skills. The COSMOS test has been conducted with the objective of **early detection of students who may have difficulties** in acquiring key math concepts in order to offer them additional support with a Personalized Intervention.

This test is part of a program structured in **three phases** to ensure effective monitoring of students' mathematical learning:



1. **Initial assessment (COSMOS test):** screening to identify students with low-performance at the beginning of the school year. Carried out with all students in the class.
2. **Personalized Intervention:** personalized support based on **scientific evidence**, directed at students with low-performance, with two main objectives:
   (a) Help the majority of students improve their performance and catch up.
   (b) Additionally, identify those who may have a learning difficulty so the school can take appropriate measures.
3. **Final assessment (COSMOS test):** follow-up assessment to measure progress achieved after the course and intervention. Carried out again with the entire class.

In this initial screening, fundamental aspects of mathematical learning have been assessed, with special attention to number sense and its properties [2]. Students who fall **below the 30th percentile** [3] in activities related to these concepts may need additional support to ensure they achieve the basic knowledge necessary to advance in mathematics.

In the *appendices* you can find additional information about the test and a collection of frequently asked questions.

[1] Our universal screening is a systematic assessment process applied to a large group of students of the same age from different schools, with the aim of identifying early those at risk of learning difficulties who may need additional support.

[2] "Number sense and its properties" refers to the basic understanding of numbers, their sequence, value, and simple relationships—such as greater/less than or addition and subtraction. This foundation is essential for progress in mathematics.

[3] The 30th percentile is a reference point: a student at this level is in the bottom 30% compared to others. Students below this percentile typically need additional support to improve their performance.

Interpretation of results graphs

The results are interpreted using the universal benchmark, which is built from the results of students of the same age who have taken the COSMOS test. This benchmark establishes an age-based reference level, allowing each student's performance to be compared with that of other students their age.

These results are shown in the graphs in the following sections, and to interpret them, it is important to understand the following elements:

- **Reference line:** the dashed line marks the **30th percentile threshold**; students who are below this line are considered to have below-average performance for their grade.
- **Students recommended for intervention:** these are the students identified as needing intervention and are shown in **bold**.

Colors according to percentile:

🟠 Students with **low performance**, below the 30th percentile of the universal benchmark.

🟢 Students with **average performance**, between the 30th and 85th percentiles of the universal benchmark.

🔵 Students with **high performance**, above the 85th percentile of the universal benchmark.

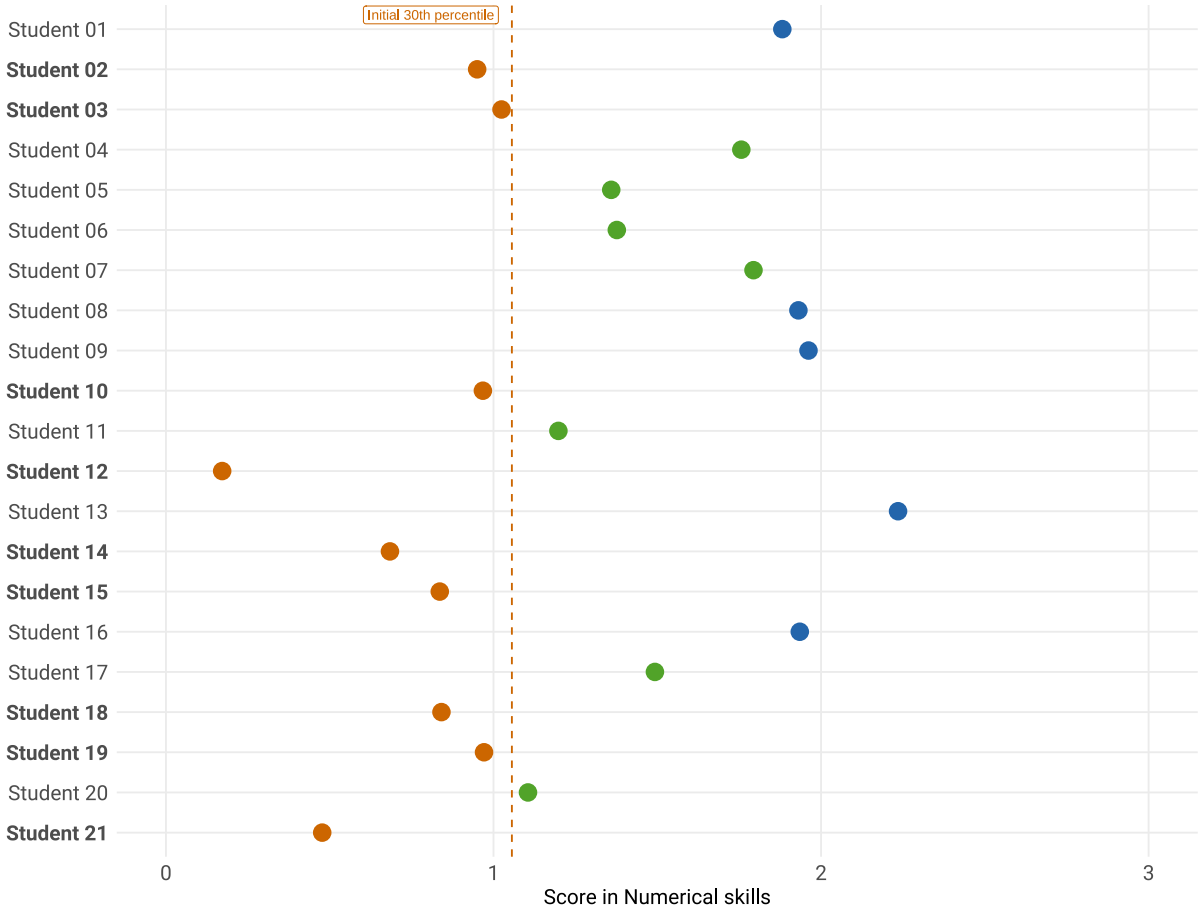
Summary of results

In this class, 21 **students have successfully completed the COSMOS test**, providing sufficient information to understand their math performance.

The graph below summarizes each student's results on **the initial COSMOS test**.

The X-axis represents the **numerical skills score**, obtained from the aggregated results of the test's key activities: arithmetic fluency, number automaticity, number line, magnitude comparison, and dot enumeration. This metric can take values in the range [0, 3] and is the same one that will be used in the final assessment.

Students located below the dashed reference line are those proposed for intervention



Intervention

Of the students who successfully completed the test, these are the ones who need intervention. As you can see, they are the same students who were to the left of the 30th percentile line in the previous graph.

- **Student 02**
- **Student 03**
- **Student 10**
- **Student 12**
- **Student 14**
- **Student 15**
- **Student 18**
- **Student 19**
- **Student 21**

Students were identified based on the results of the key activities that make up number sense, and **those scoring below the 30th percentile of the universal benchmark were selected**. Detailed results for each activity are shown in the following sections.

For more information on the Intervention, refer to **this page**.

Participation

Total students in the class	21

✅ **Students with sufficient information to be assessed**	**21**

⚠️ **Of these, there are students who show indicators of very low attention during the test** [a], so their results may be affected:

- Student 12

[a] A low level of attention indicates that the student has shown signs of distraction or lack of concentration during the test. This is measured through the indicators in the "behavioral factors for analysis" section

❌ **Students who can't be assessed**	**0**

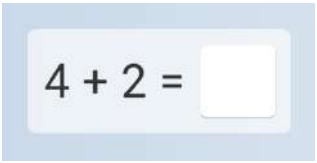
Overall Class Results

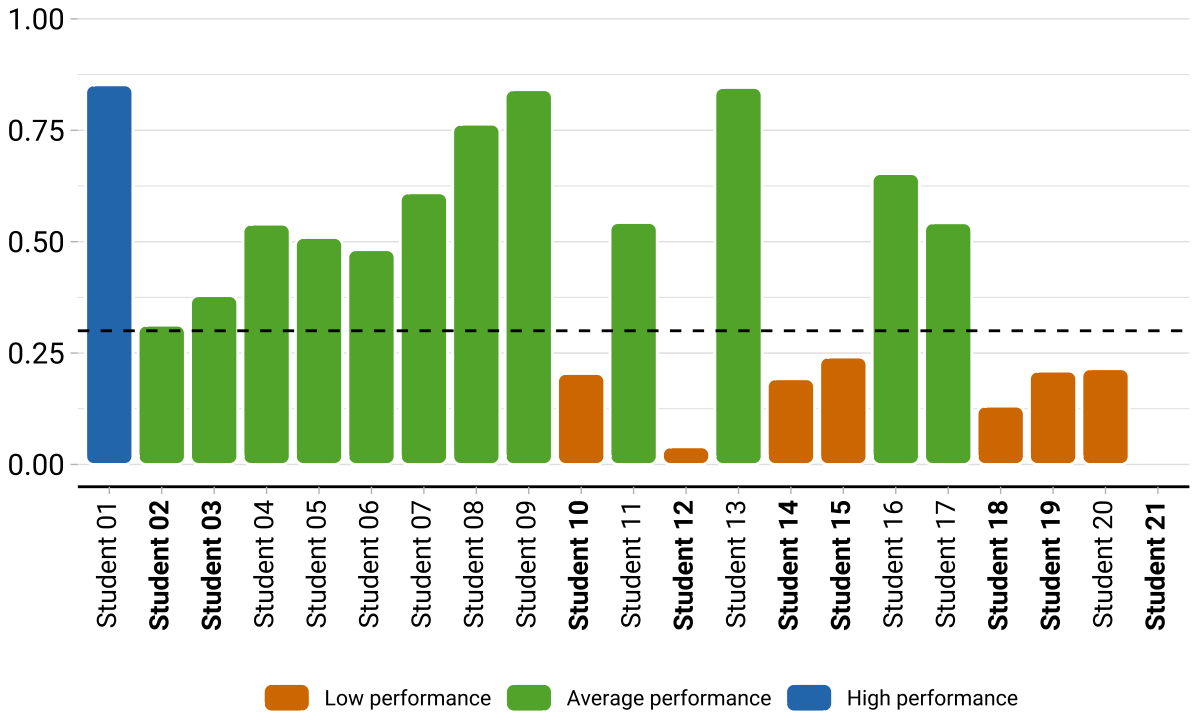
The following section shows the **students' results in each activity and in the behavioral factors** relevant to the analysis. Each student receives a score between 0 and 1 for each test, where 1 represents the highest score achieved by any student who has taken the test.

Activities directly related to mathematical skills

These evaluate the understanding of basic concepts and fluency in operations, which is essential for progress in mathematics.

Arrithmetic fluency

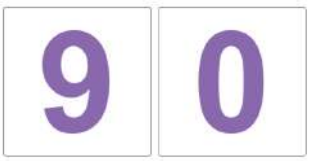
Image	Student task	Objective
	Solve the operations as quickly as they can.	Measure students' ability to develop fact fluency with basic operations, an essential skill for performance in more advanced mathematics. This is the most important activity and carries greater weight in determining which students require intervention.

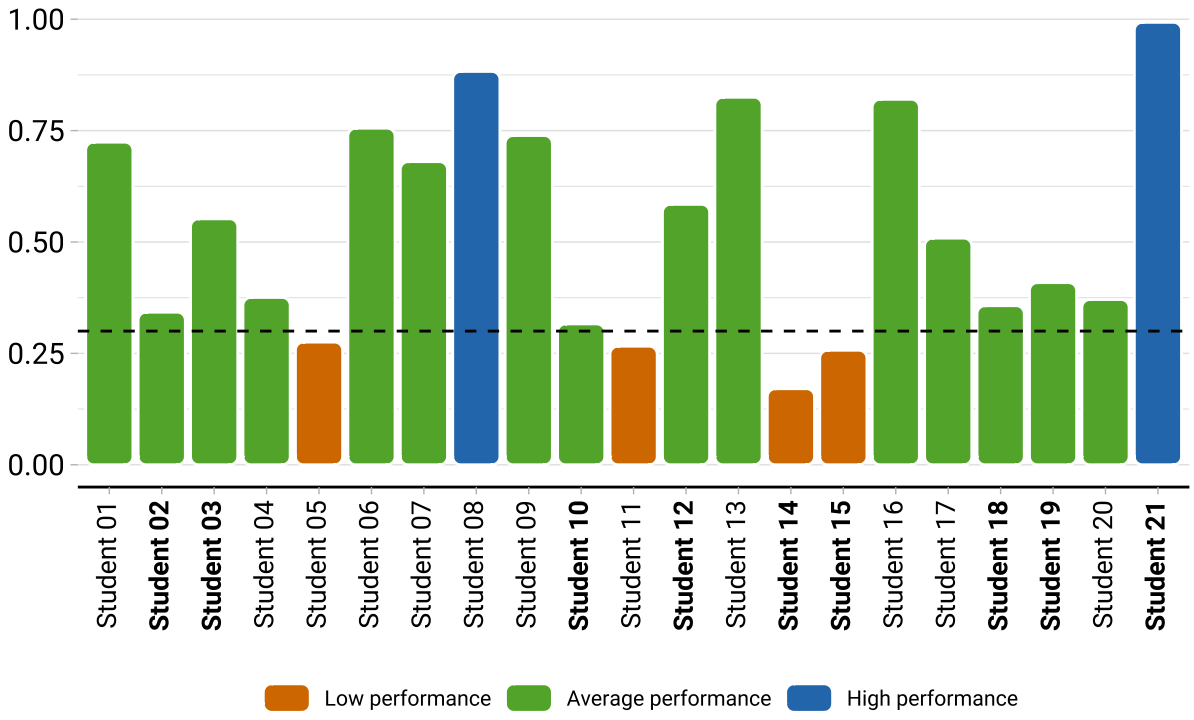


The following students **did not complete the activity** in the COSMOS test:

- Student 21

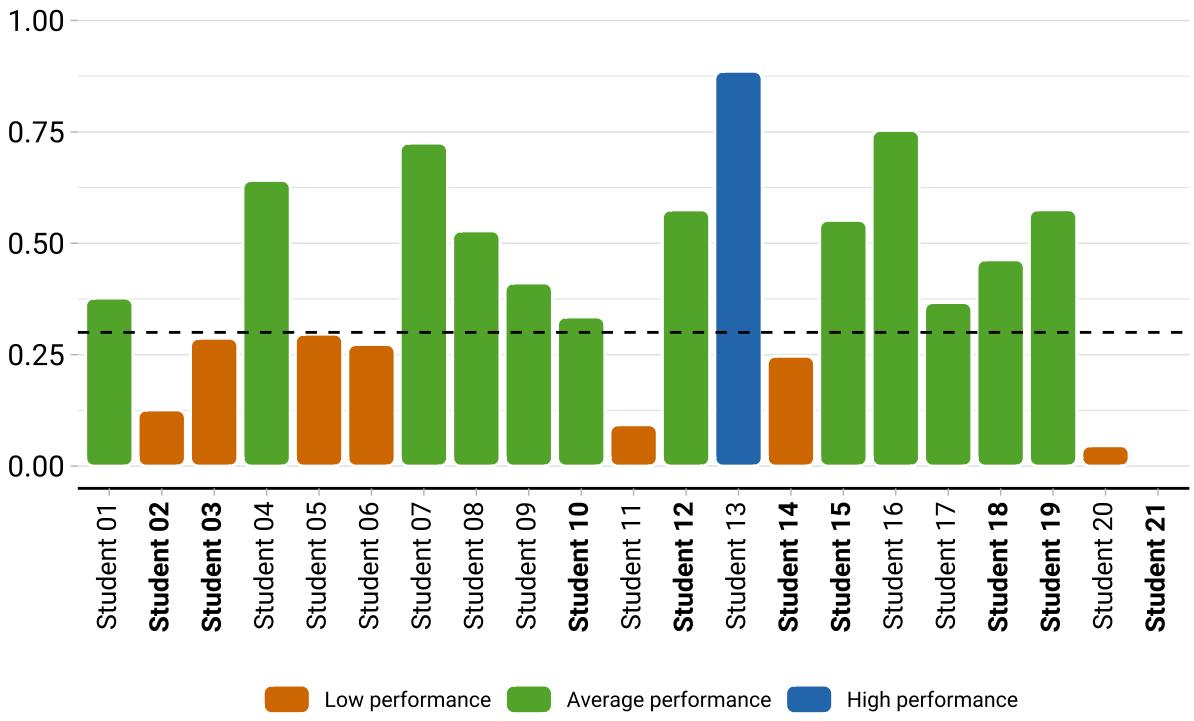
Number automaticity

Image	Student task	Objective
	Select the number with the greater magnitude between two given options.	Measure students' ability to automatically recognize and process numbers from 0 to 9, an essential skill for quick calculation and basic understanding of mathematics.



Dot enumeration

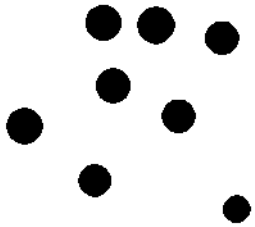
Image	Student task	Objective
6	Answer whether the number of dots in the image matches the number shown.	Measure students' ability and fluency in recognizing arabic numerals and identifying the quantity in sets of dots.

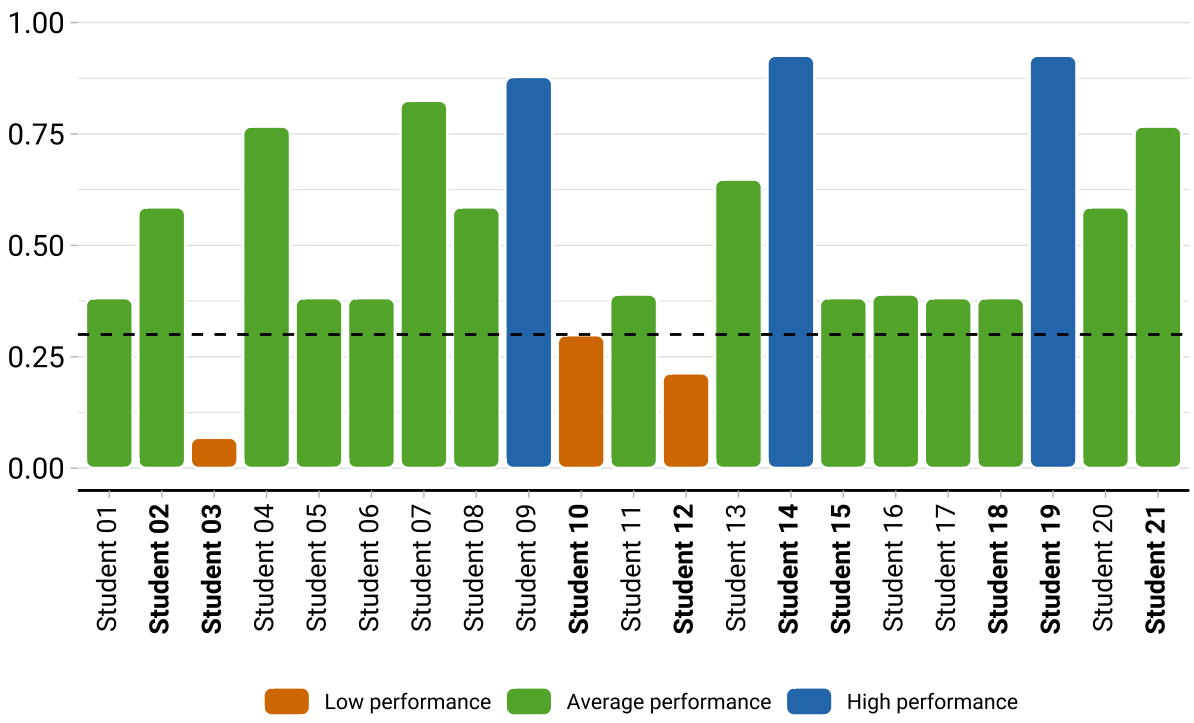


The following students **did not complete the activity** in the COSMOS test:

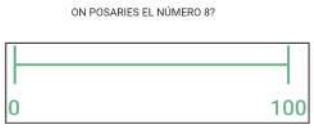
- Student 21

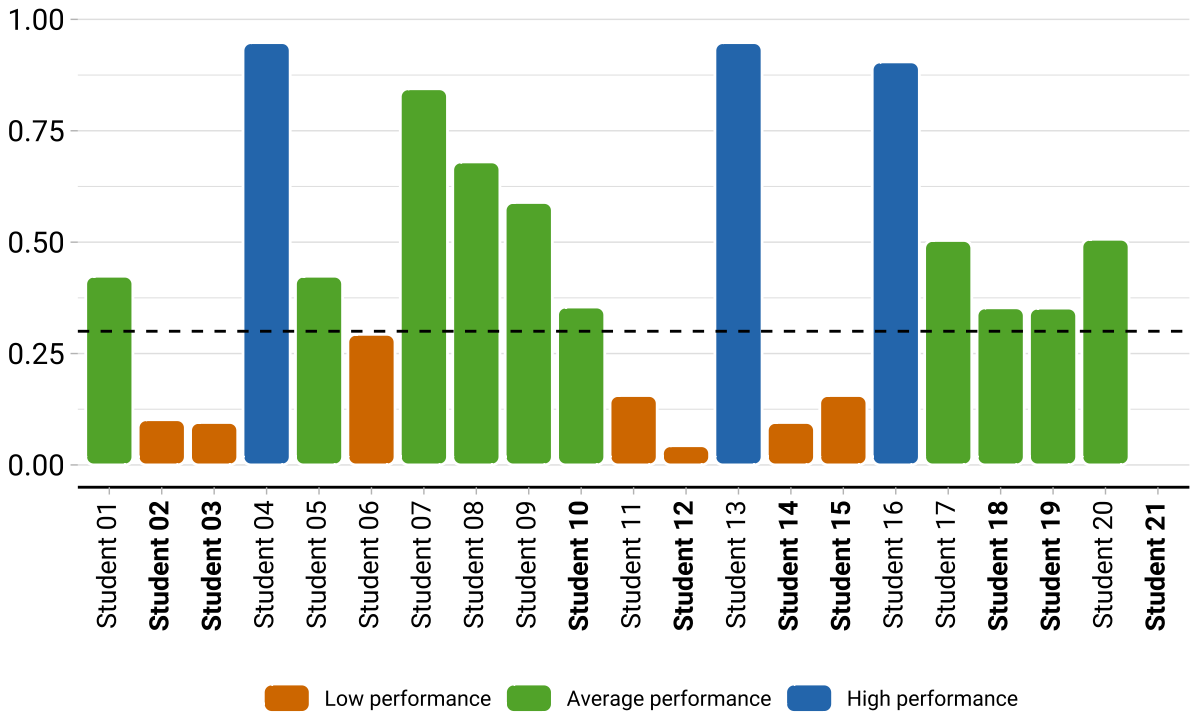
Comparison of magnitudes

Image	Student task	Objective
	Observe the number of dots in the first image and indicate whether they match those in the second.	Measure students' ability to perceive and compare visual quantities (represented with dots), a key skill for developing number sense and concepts of comparison and quantification.



Number Line

Image	Student task	Objective
	Identify the position of a number on the Number Line.	Measure students' ability to place numbers on a Number Line, a skill that gradually contributes to their understanding of number sequence and place value. Although the Number Line ranges from 0 to 100, the goal is to explore this initial ability without requiring complete mastery at this stage.



The following students **did not complete the activity** in the COSMOS test:

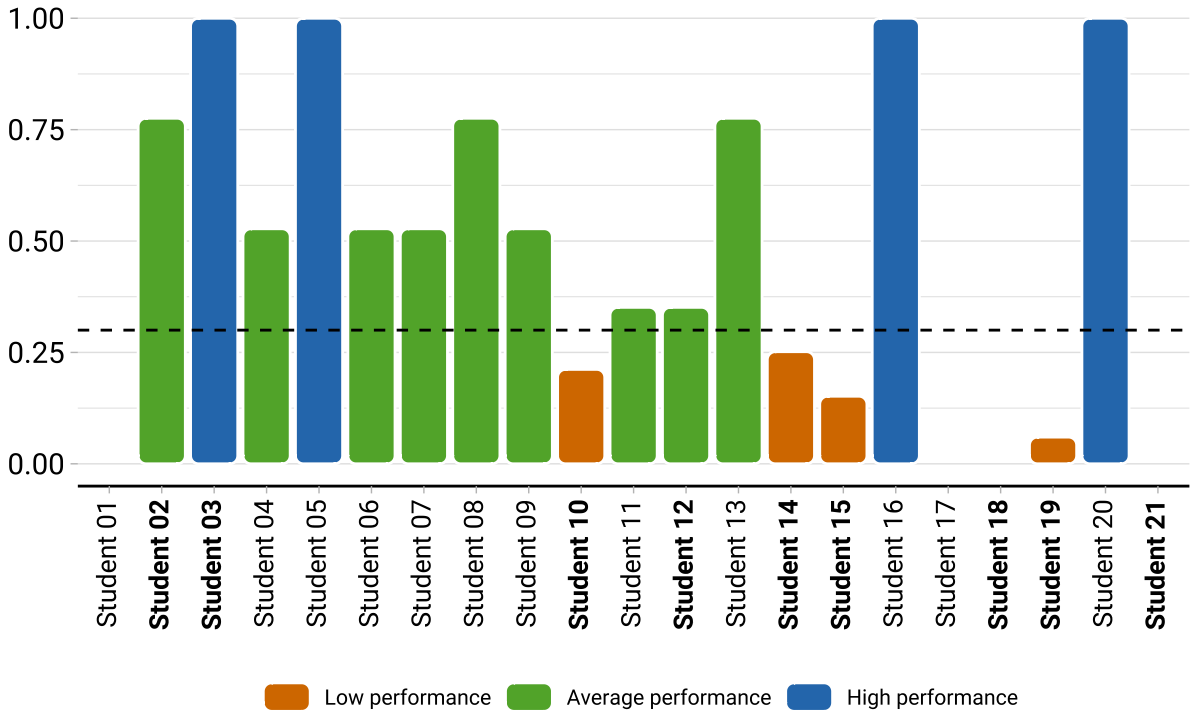
- Student 21

Activities related to general cognitive skills relevant to learning

These measure memory and reasoning, skills that support learning and problem solving, whether mathematical in nature or not.

Working memory

Image	Student task	Objective
	Memorize the images.	Measure students' ability to maintain and manipulate information in memory while avoiding distractions, an essential skill for solving mathematical problems.

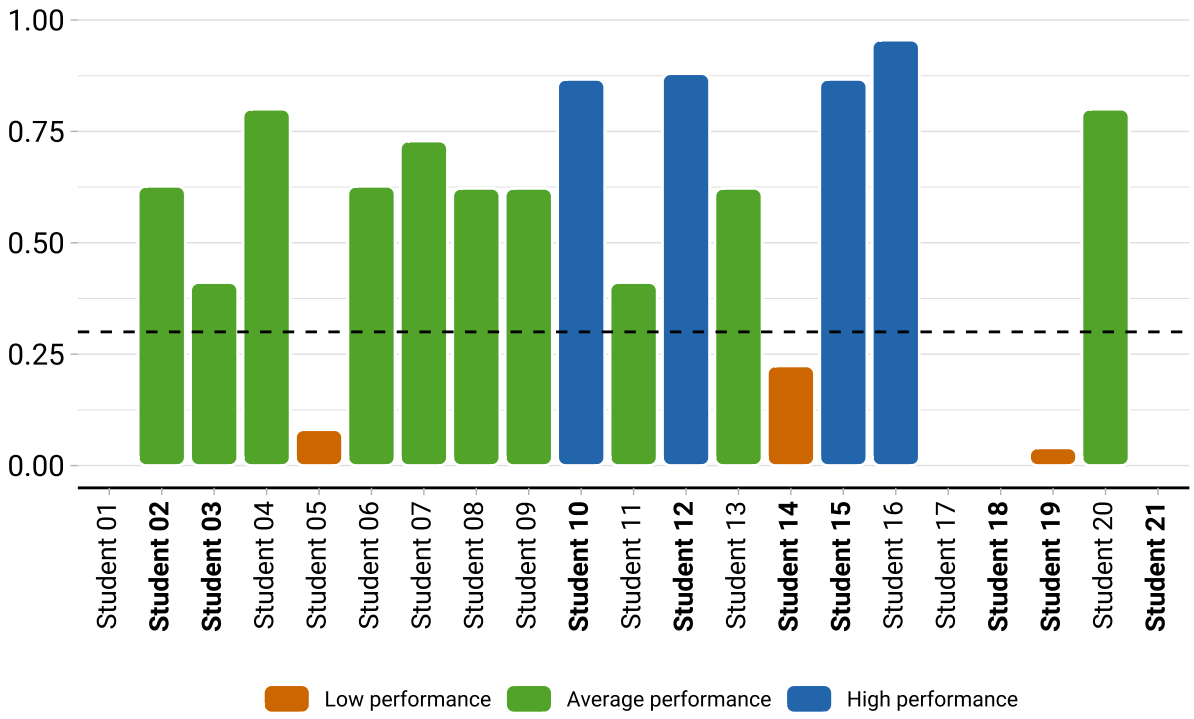


The following students **did not complete the activity** in the COSMOS test:

- Student 01
- Student 17
- Student 18
- Student 21

Reasoning

Image	Student task	Objective
	Select the missing piece to complete the image.	Measure students' ability to reason with concepts, identify logical patterns, and deduce their continuity, a key skill for understanding advanced concepts and solving complex problems.



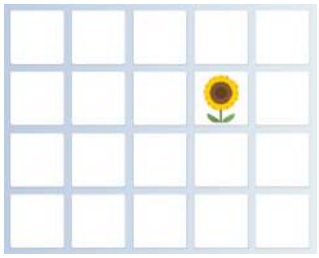
The following students **did not complete the activity** in the COSMOS test:

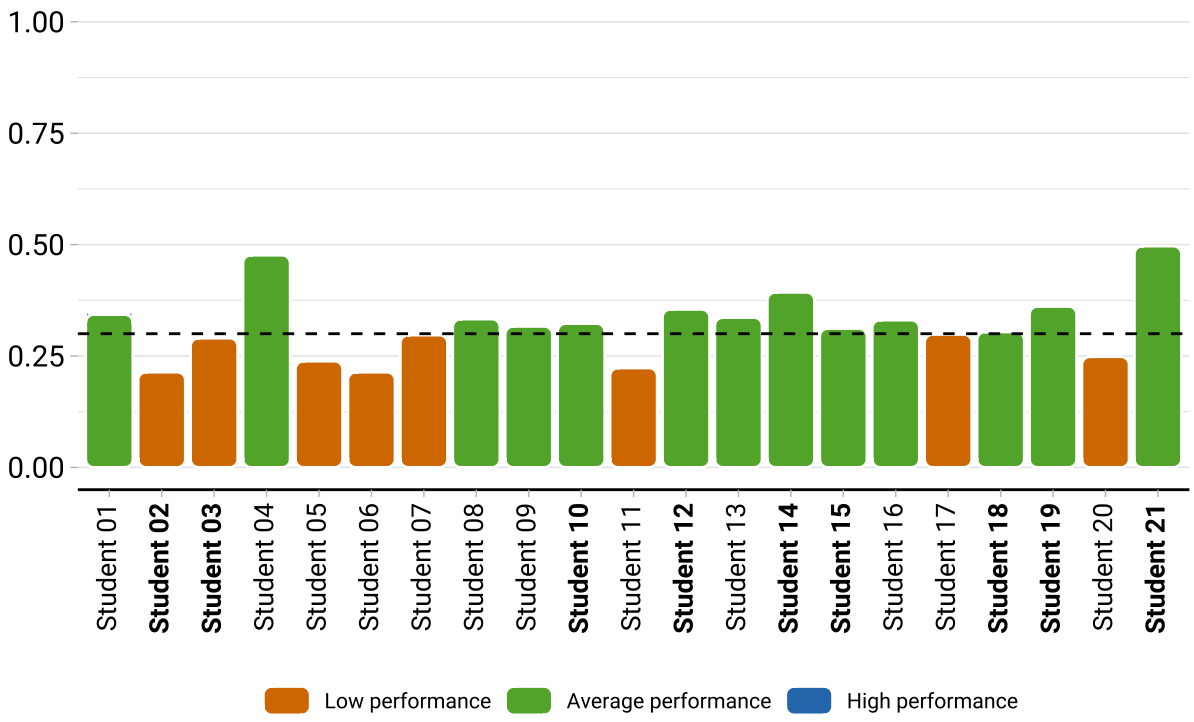
- Student 01
- Student 17
- Student 18
- Student 21

Behavioral factors relevant for analysis

These analyze the student's speed and attention, which can influence performance in mathematics.

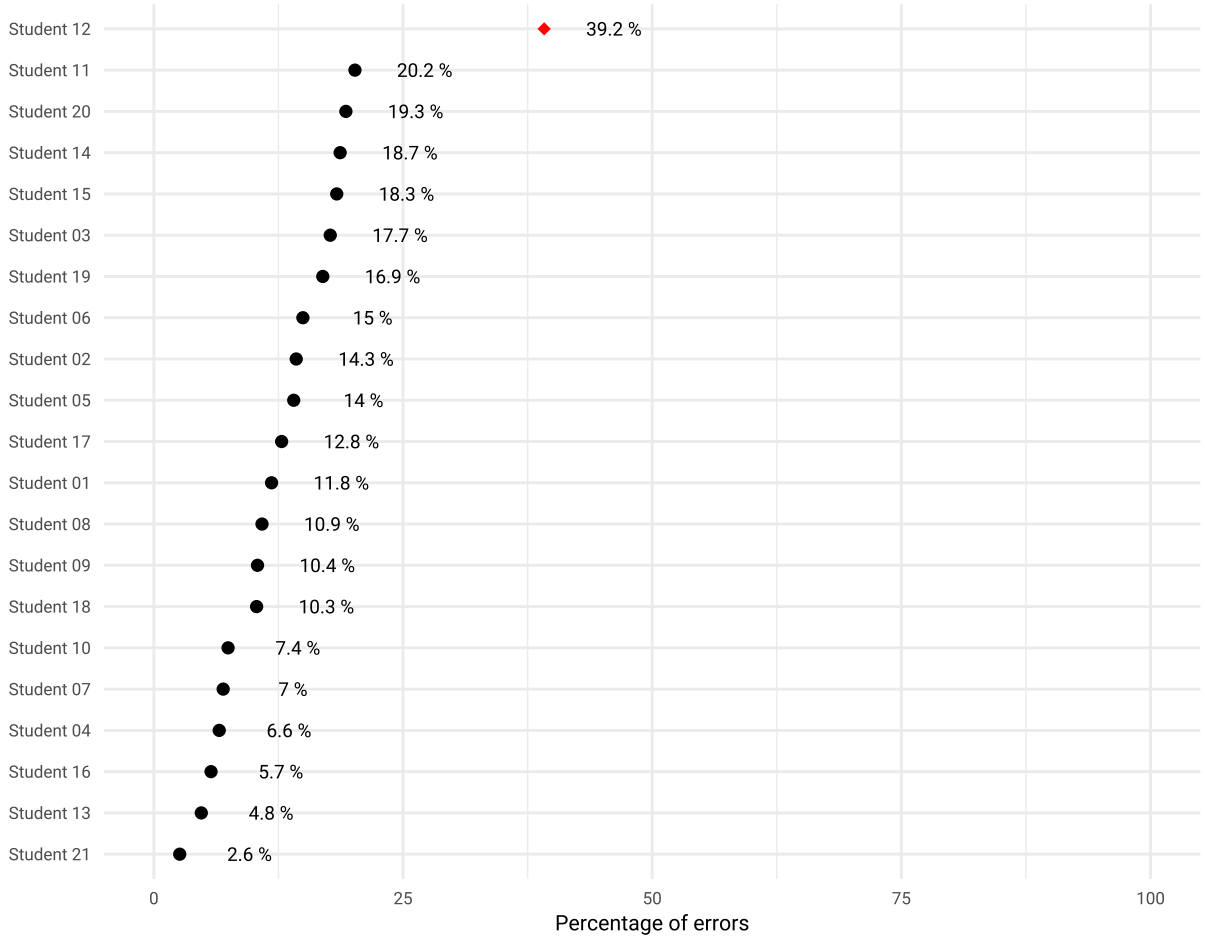
Execution speed

Image	Student task	Objective
	Click on the flower as quickly as they can.	Measure the student's speed and dexterity when manipulating the test device, important information for accurately interpreting timed tasks.



Response Behavior

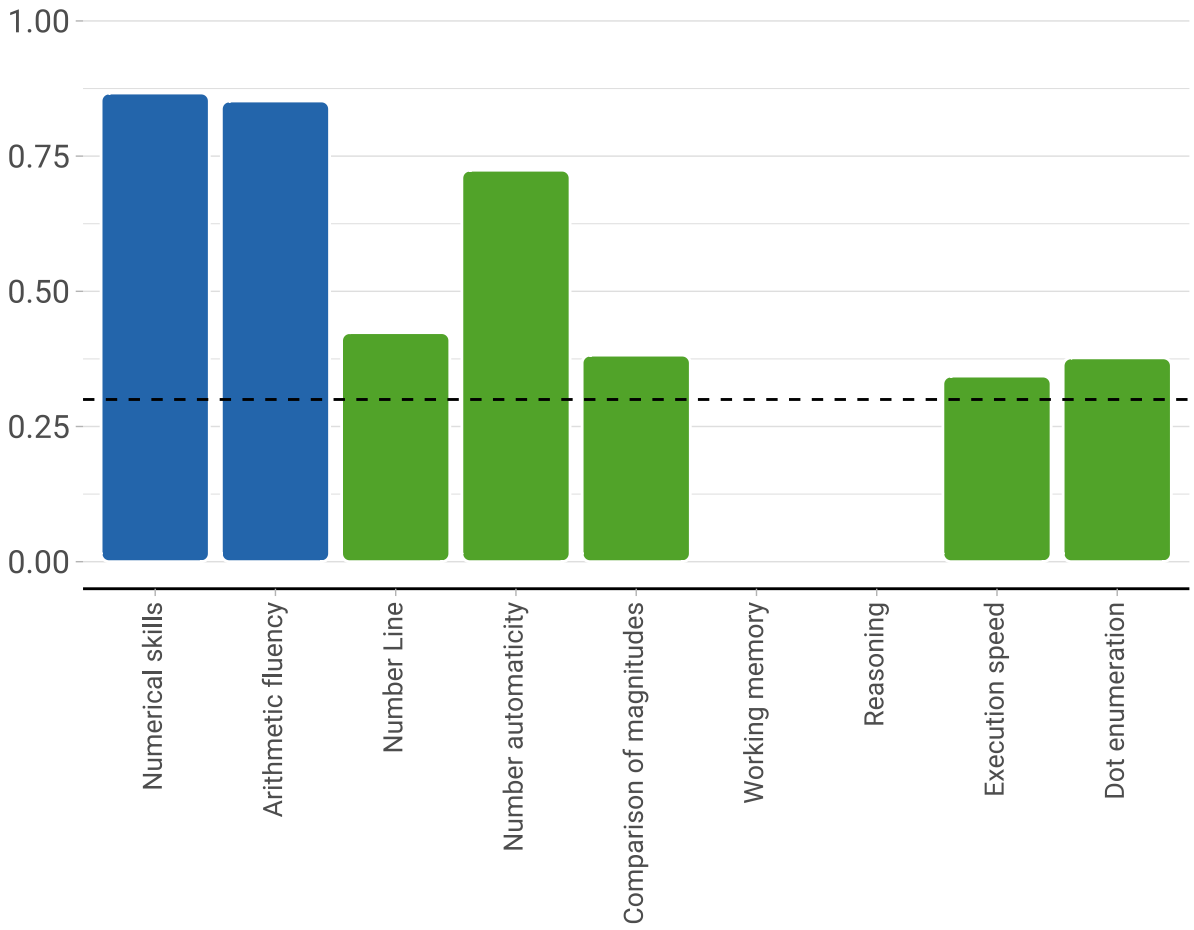
This factor is not an activity itself, but a measure calculated from errors in other activities. It provides information about the student's response style, indicating whether they prioritize speed or accuracy. A very high value may reflect lack of attention during the test. Students with response behavior marked in **red** are considered cases of **low attention** in the evaluation of results.



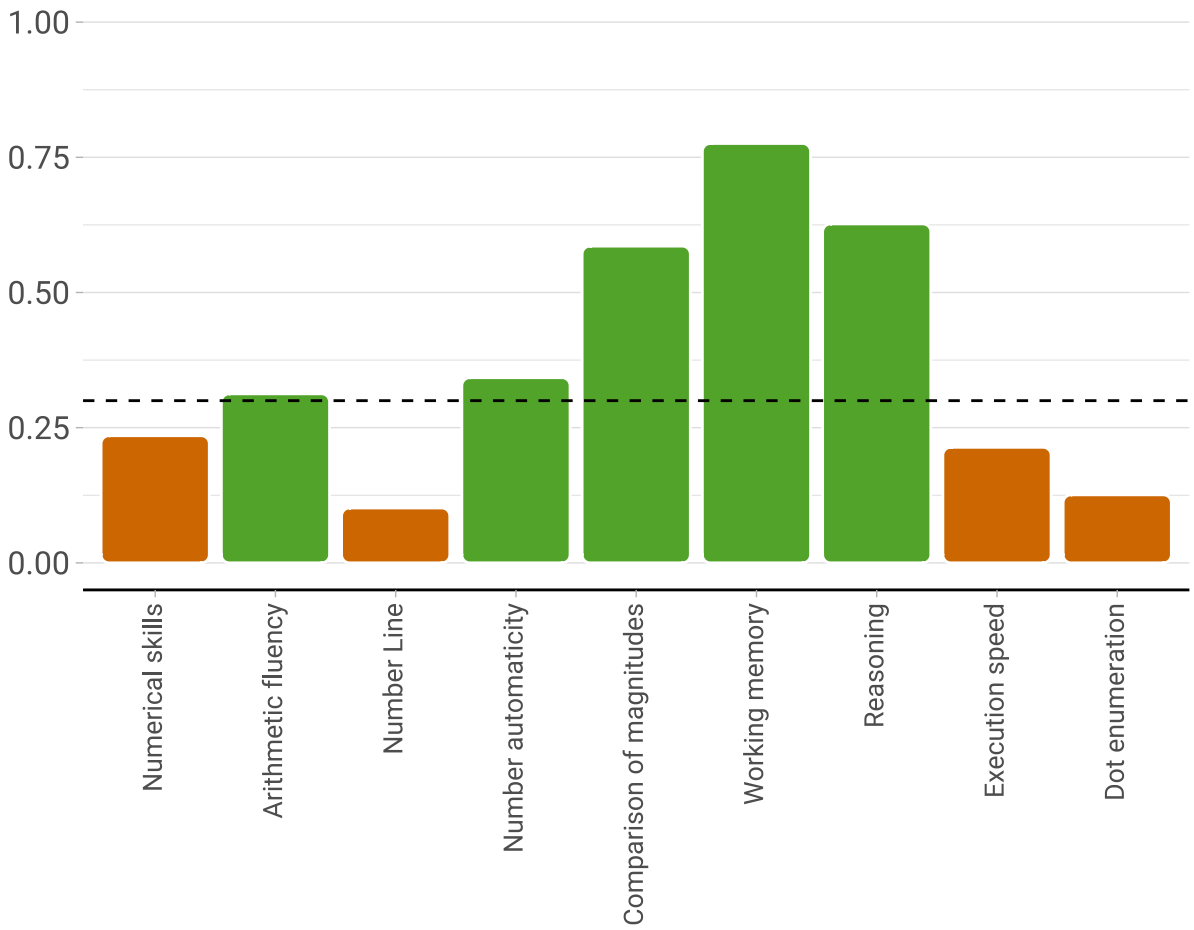
Individual Profiles

This section presents individual profiles of each student who participated in the test, detailing their performance in each activity. These profiles help identify strengths and areas for improvement, allowing educational support to be adapted to their specific needs.

Student 01

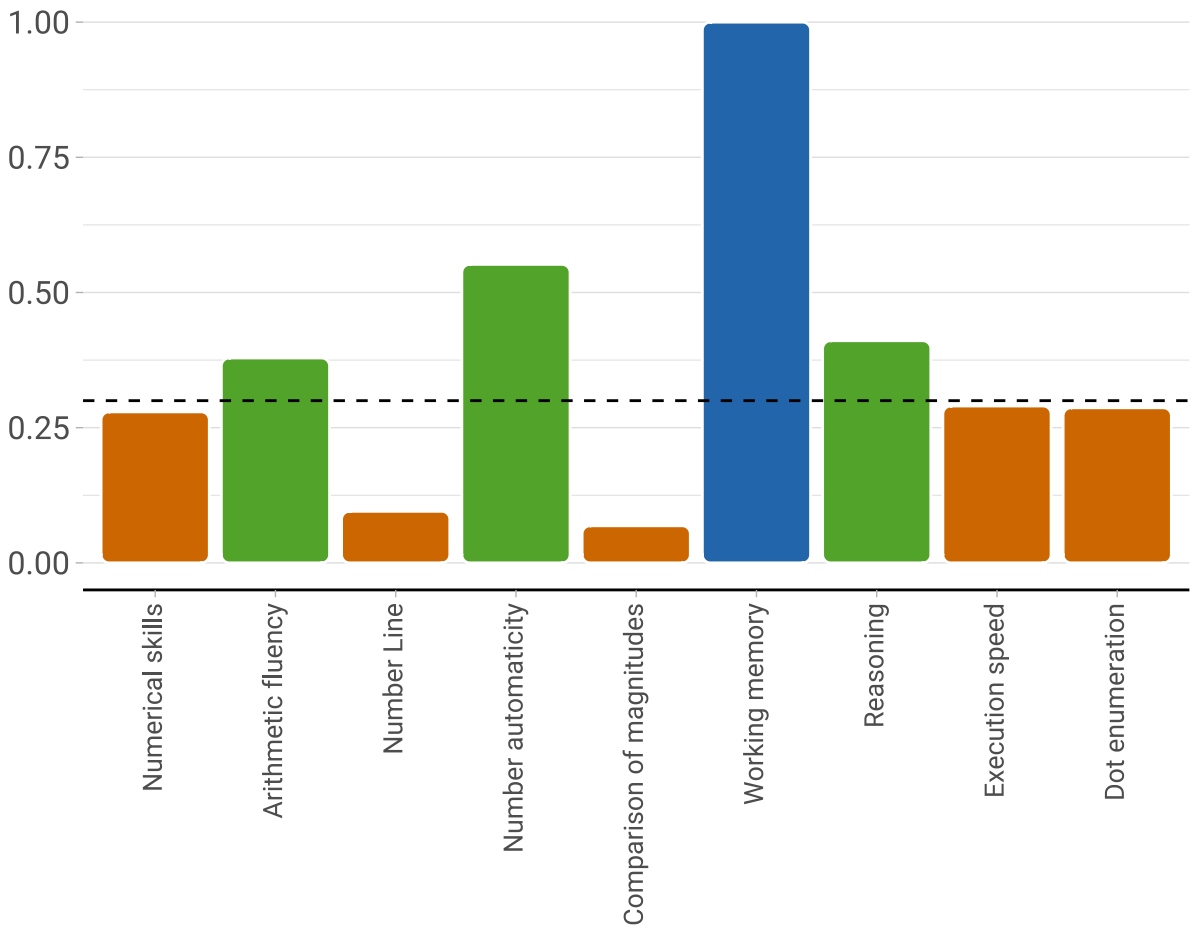


Student 02



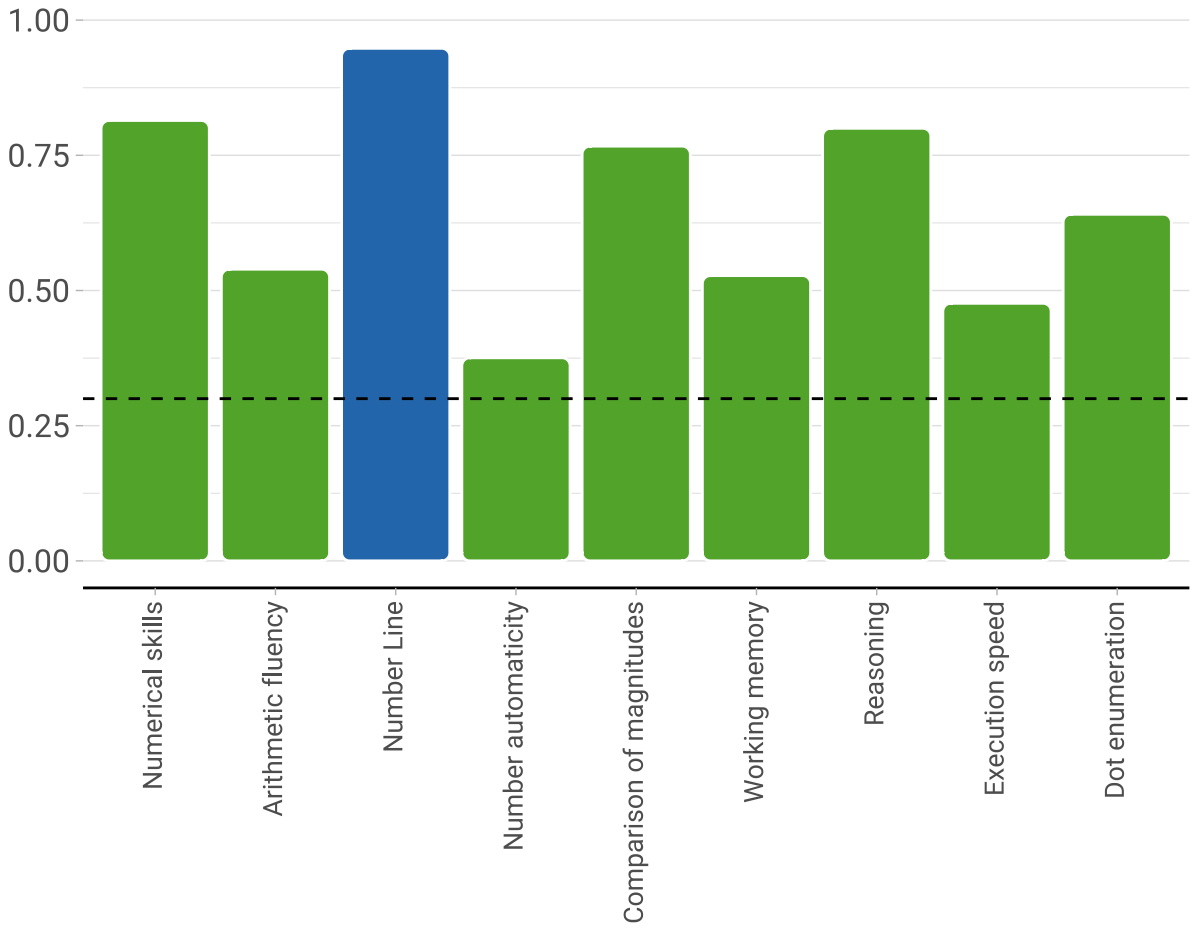
Needs to complete Support Intervention, since they show a very low level of performance in activities related to mathematical skills.

Student 03



Needs to complete Support Intervention, since they show a very low level of performance in activities related to mathematical skills.

Student 04


1.00
0.75
0.50
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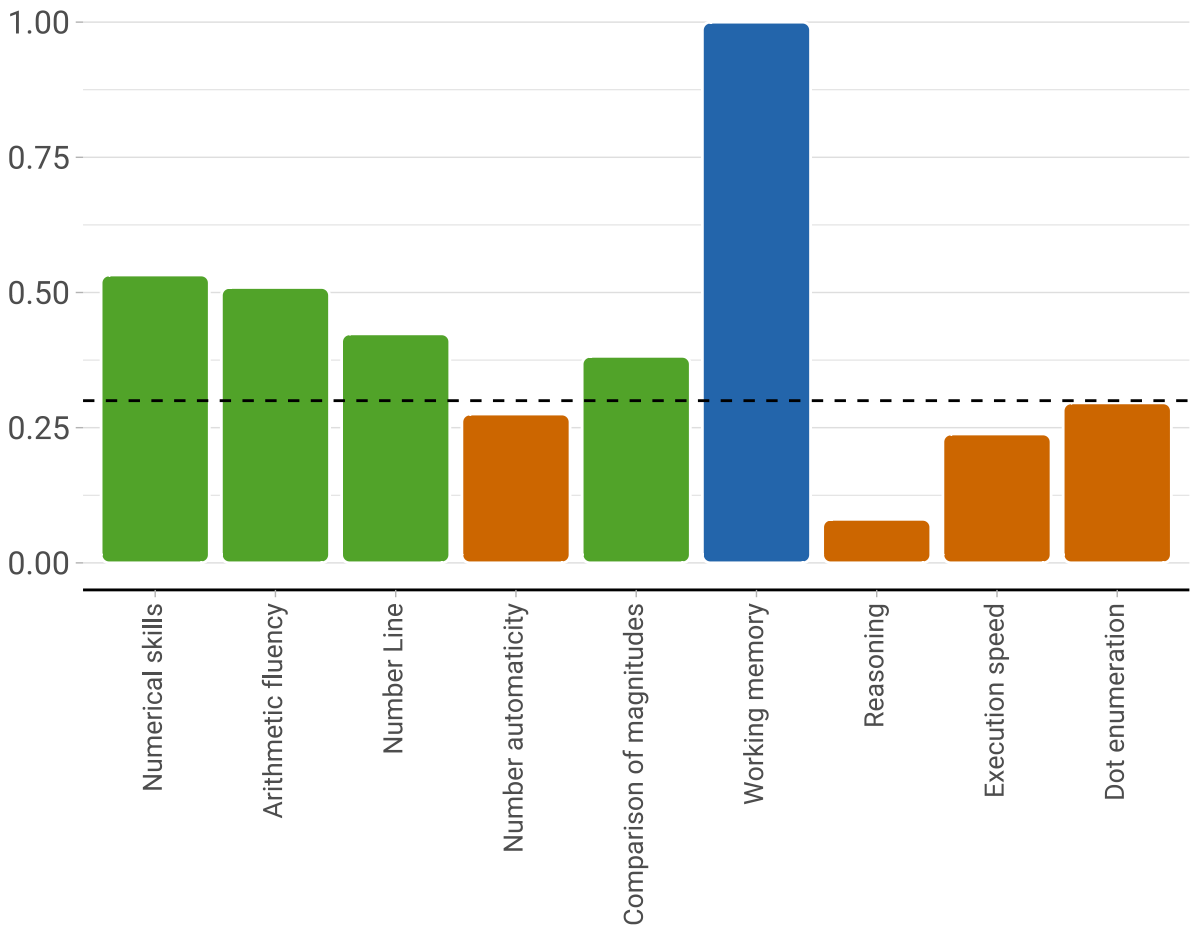
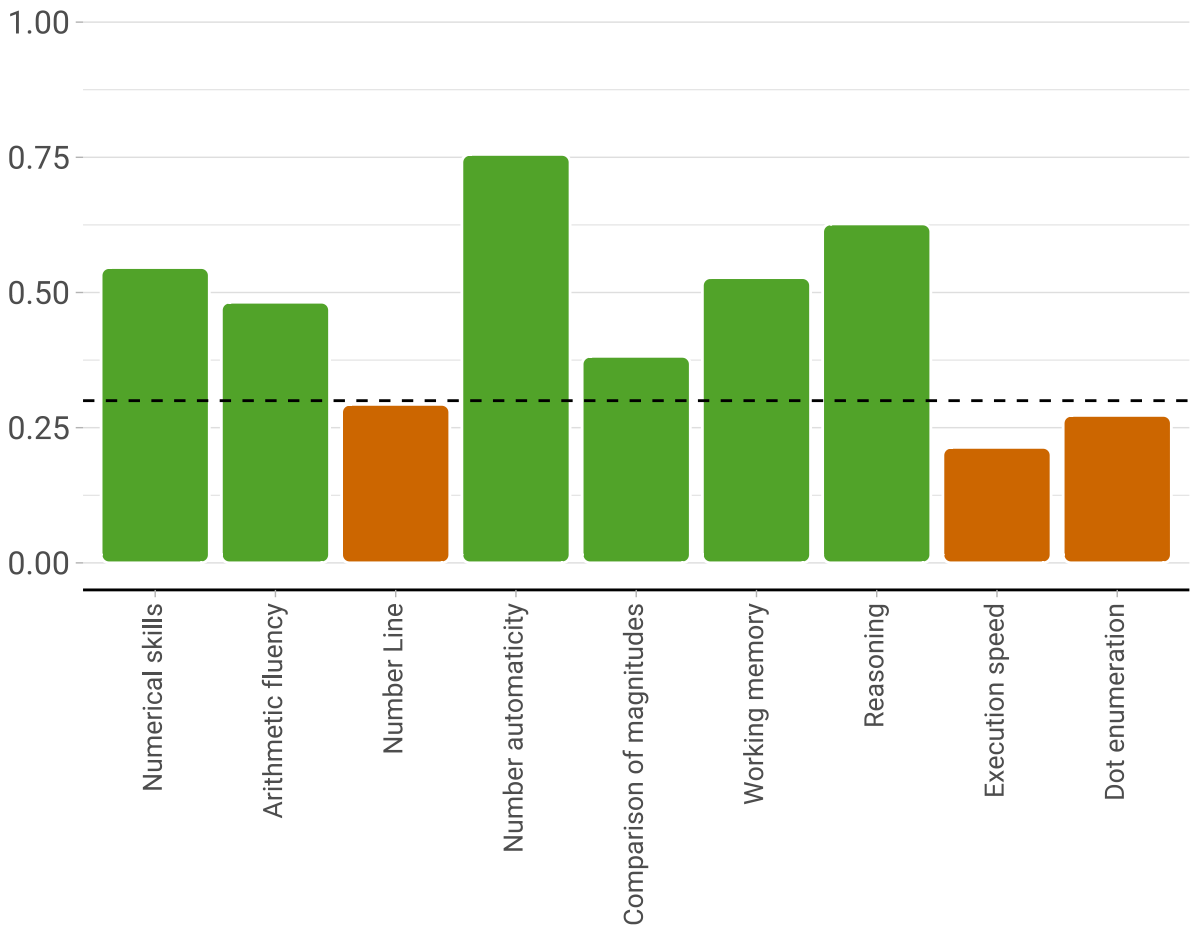
Numerical skills
Arithmetic fluency
Number Line
Number automaticity
Comparison of magnitudes
Working memory
Reasoning
Execution speed
Dot enumeration

Student 05



In the student profile, we highlight that they show a very low level in Reasoning.

Student 06


1.00
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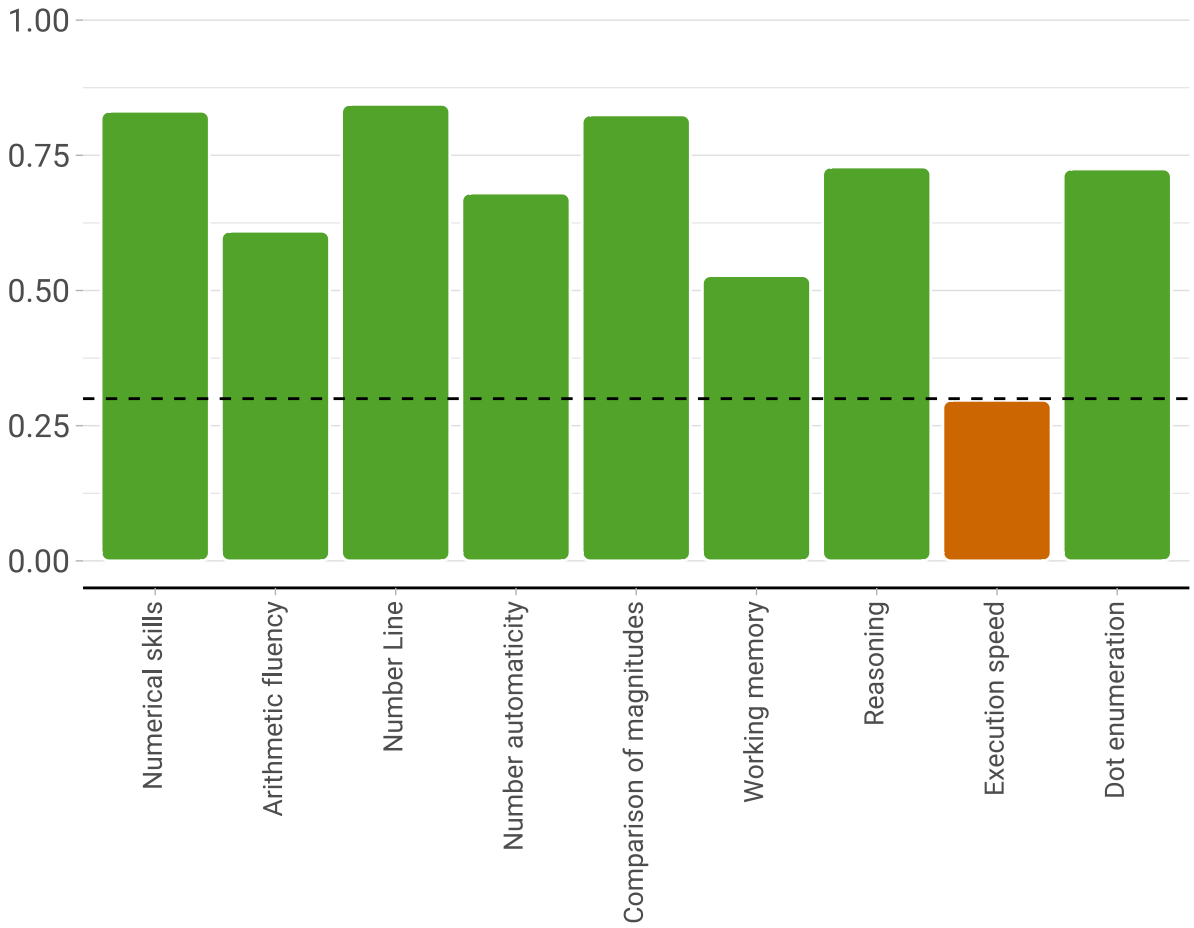
0.00
Numerical skills
Arithmetic fluency
Number Line
Number automaticity
Comparison of magnitudes
Working memory
Reasoning
Execution speed
Dot enumeration

Student 07


1.00
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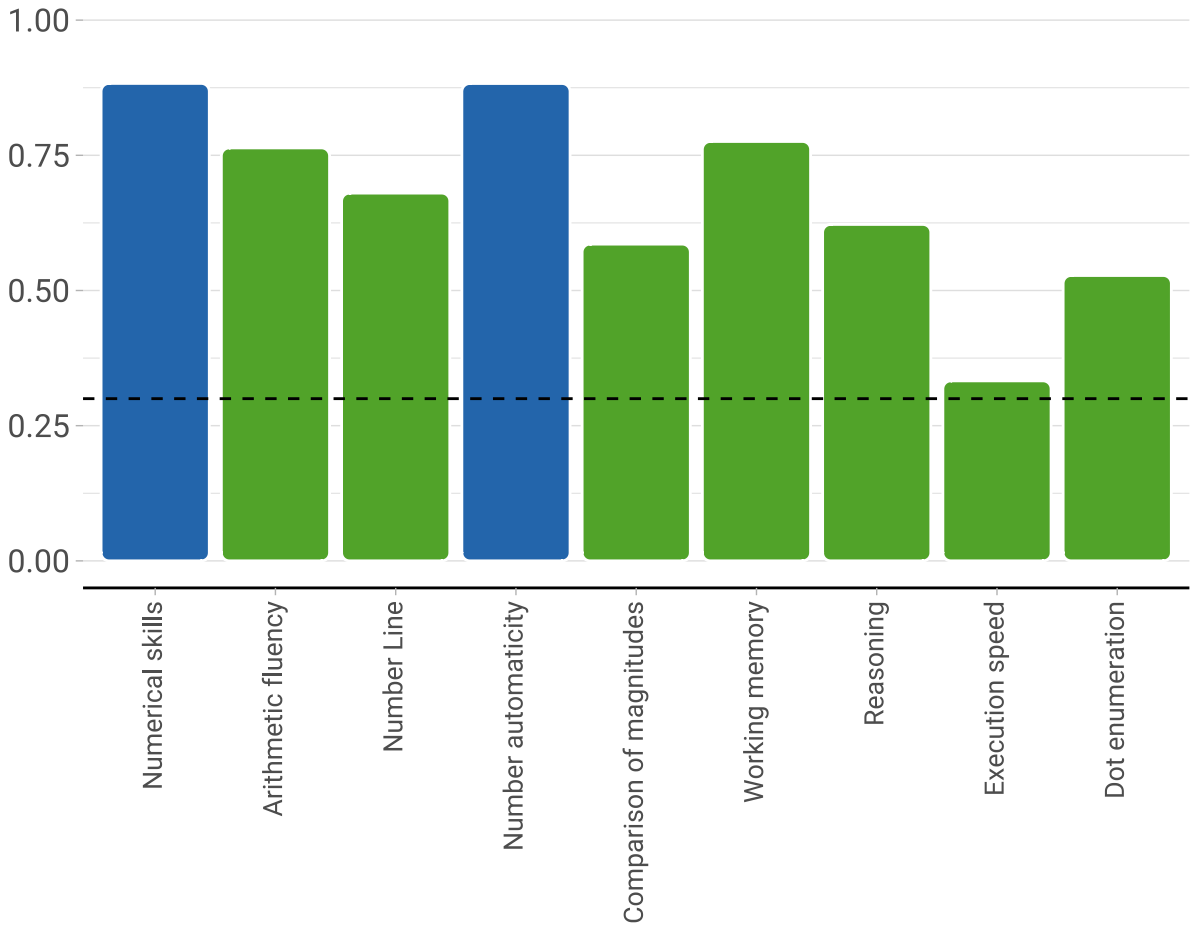
0.00
Numerical skills
Arithmetic fluency
Number Line
Number automaticity
Comparison of magnitudes
Working memory
Reasoning
Execution speed
Dot enumeration

Student 08


1.00
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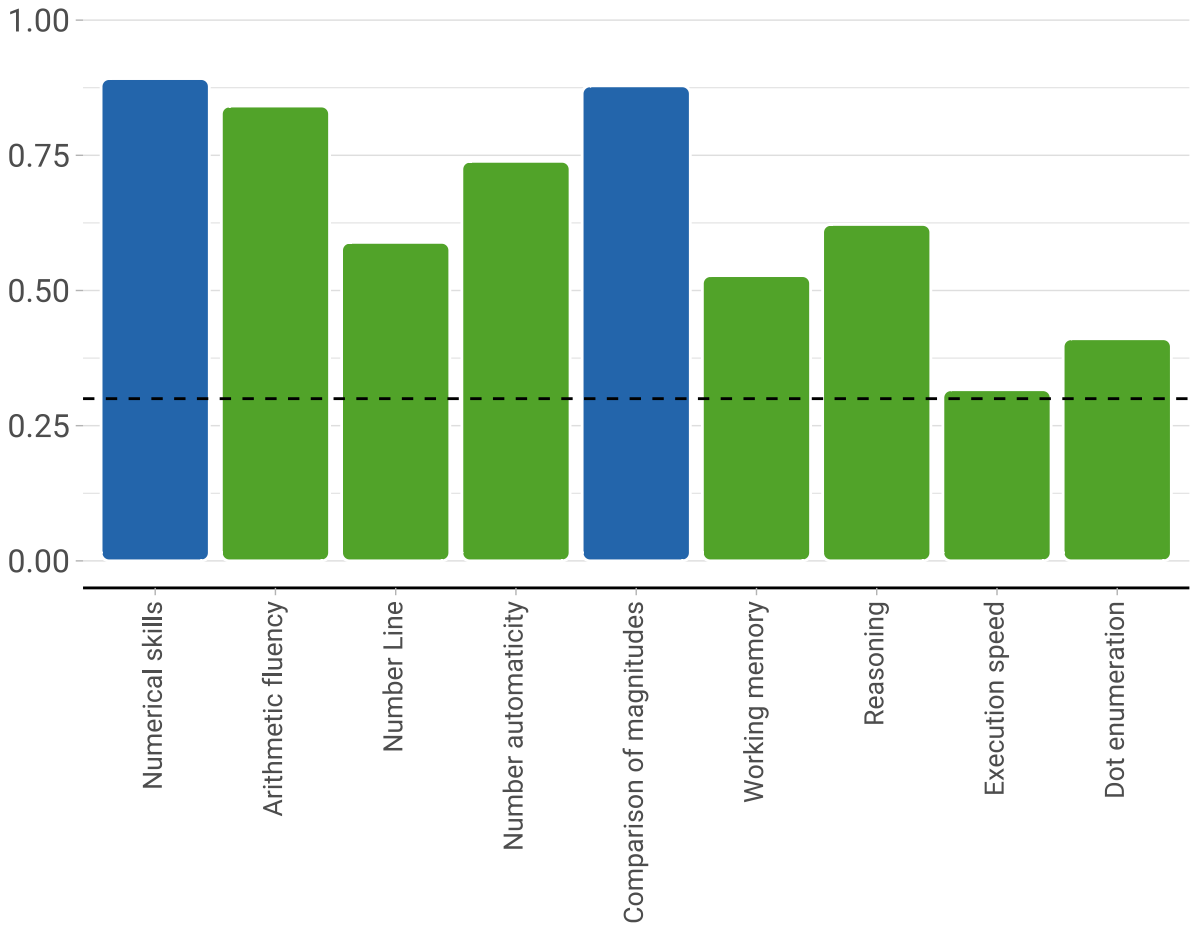
0.25
0.00
Numerical skills
Arithmetic fluency
Number Line
Number automaticity
Comparison of magnitudes
Working memory
Reasoning
Execution speed
Dot enumeration

Student 09


1.00
0.75
0.50
0.25
0.00
Numerical skills
Arithmetic fluency
Number Line
Number automaticity
Comparison of magnitudes
Working memory
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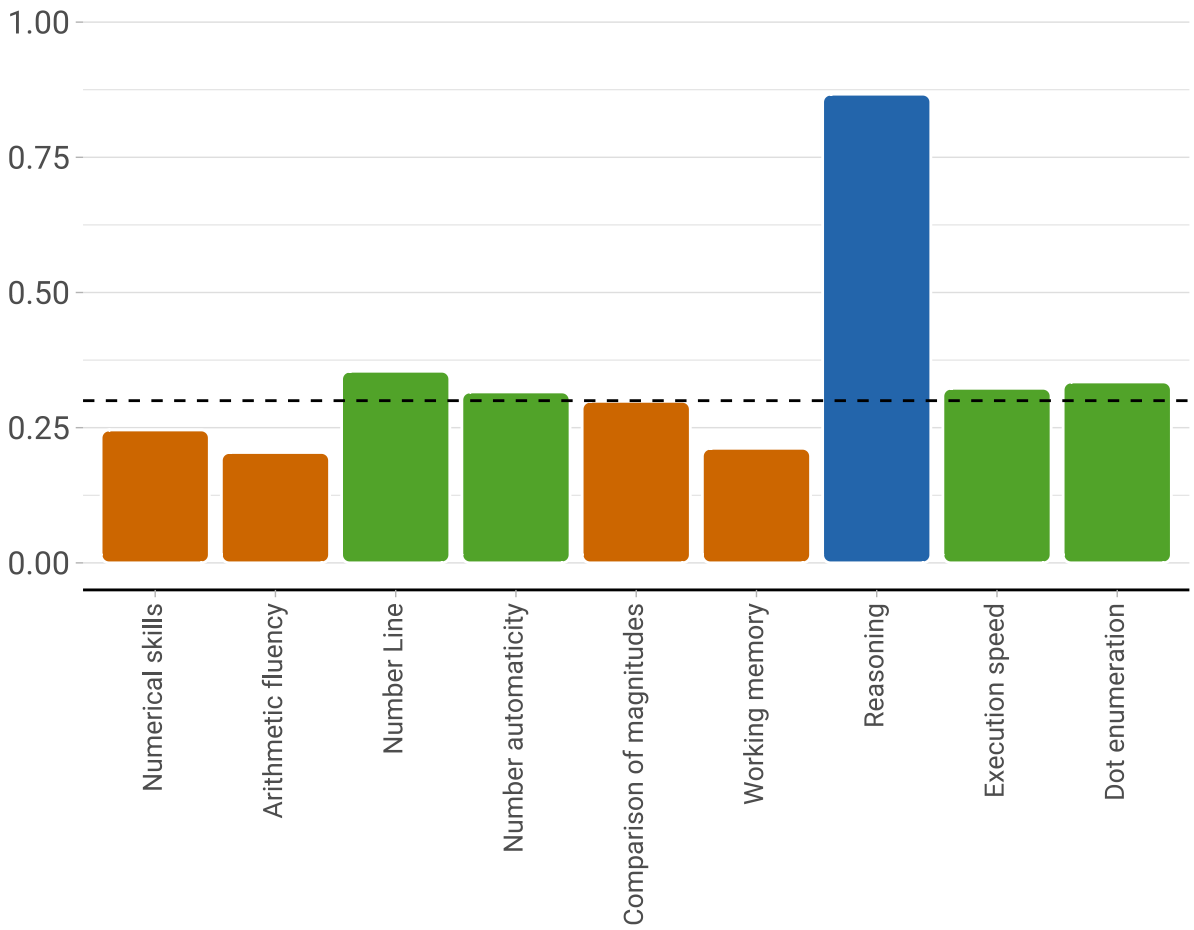
Dot enumeration

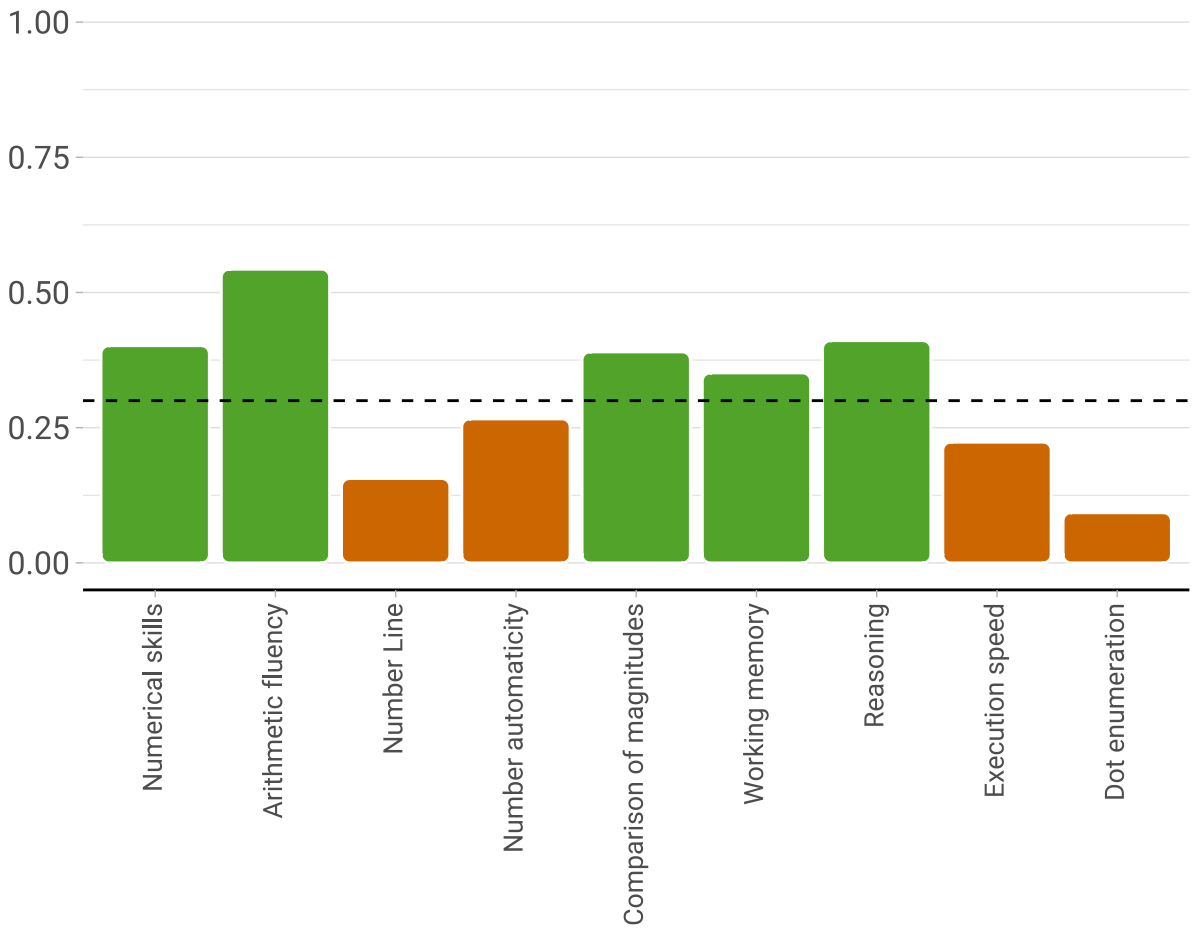
Student 10



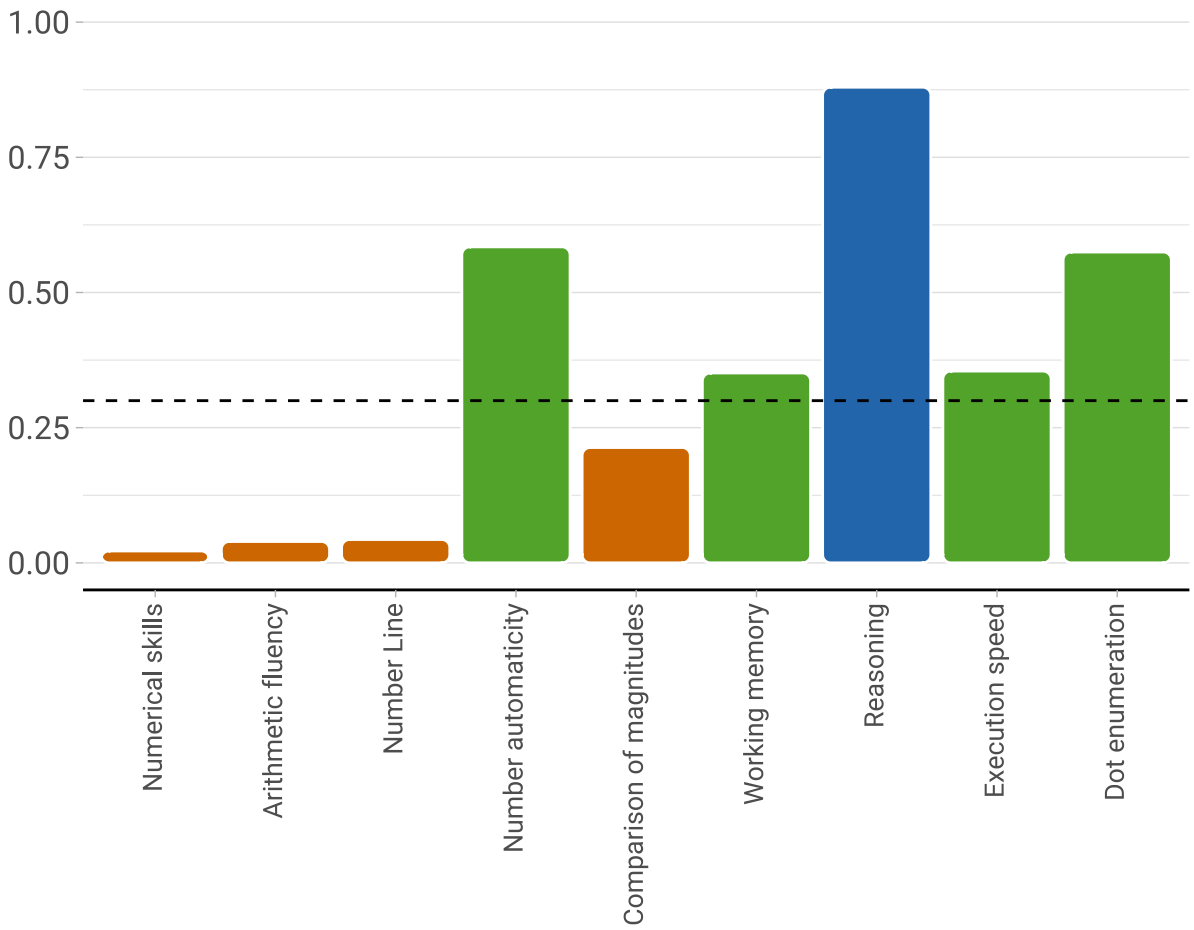
Needs to complete Support Intervention, since they show a very low level of performance in activities related to mathematical skills.

In the student profile, we highlight that they show a very low level in Working Memory.

Student 11


1.00
0.75
0.50
0.25
0.00
Numerical skills
Arithmetic fluency
Number Line
Number automaticity
Comparison of magnitudes
Working memory
Reasoning
Execution speed
Dot enumeration

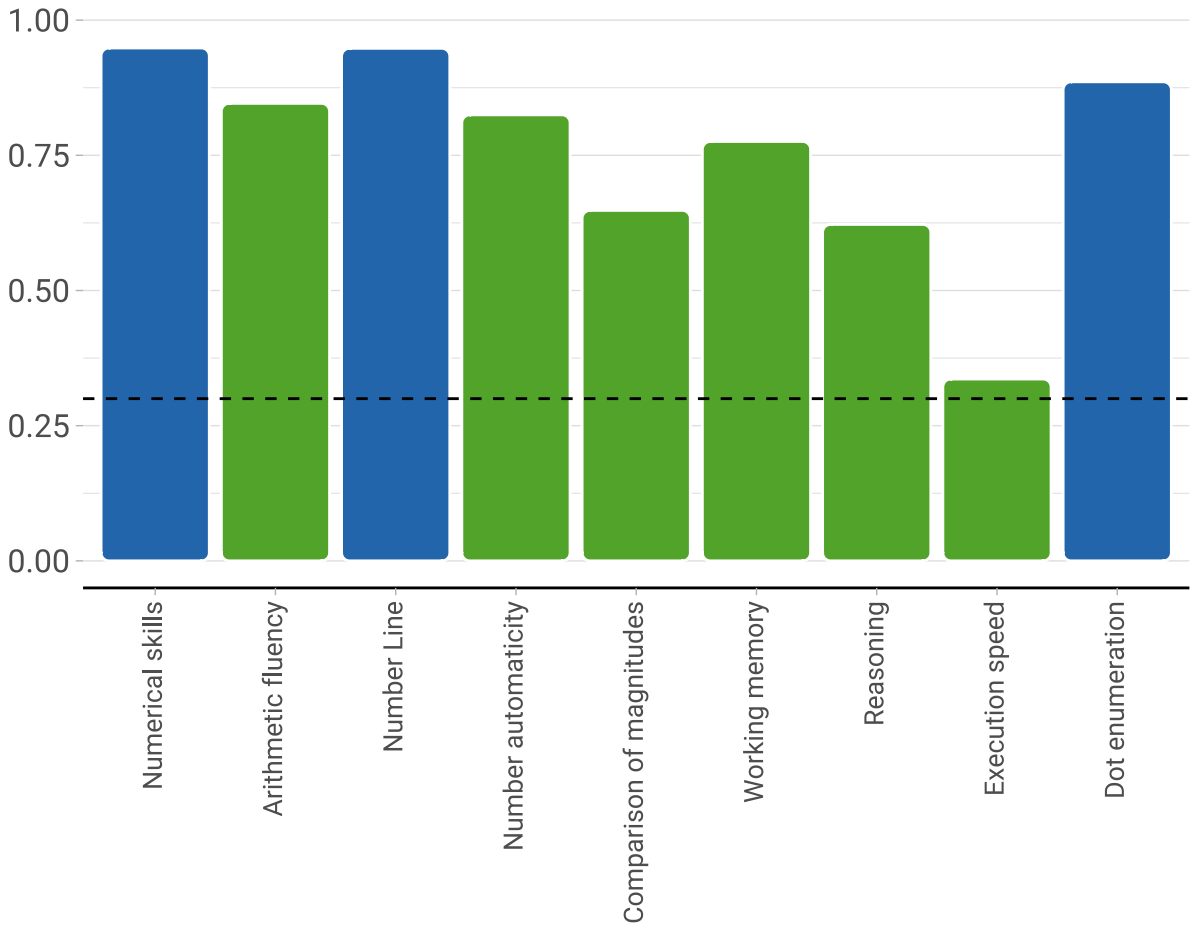
Student 12



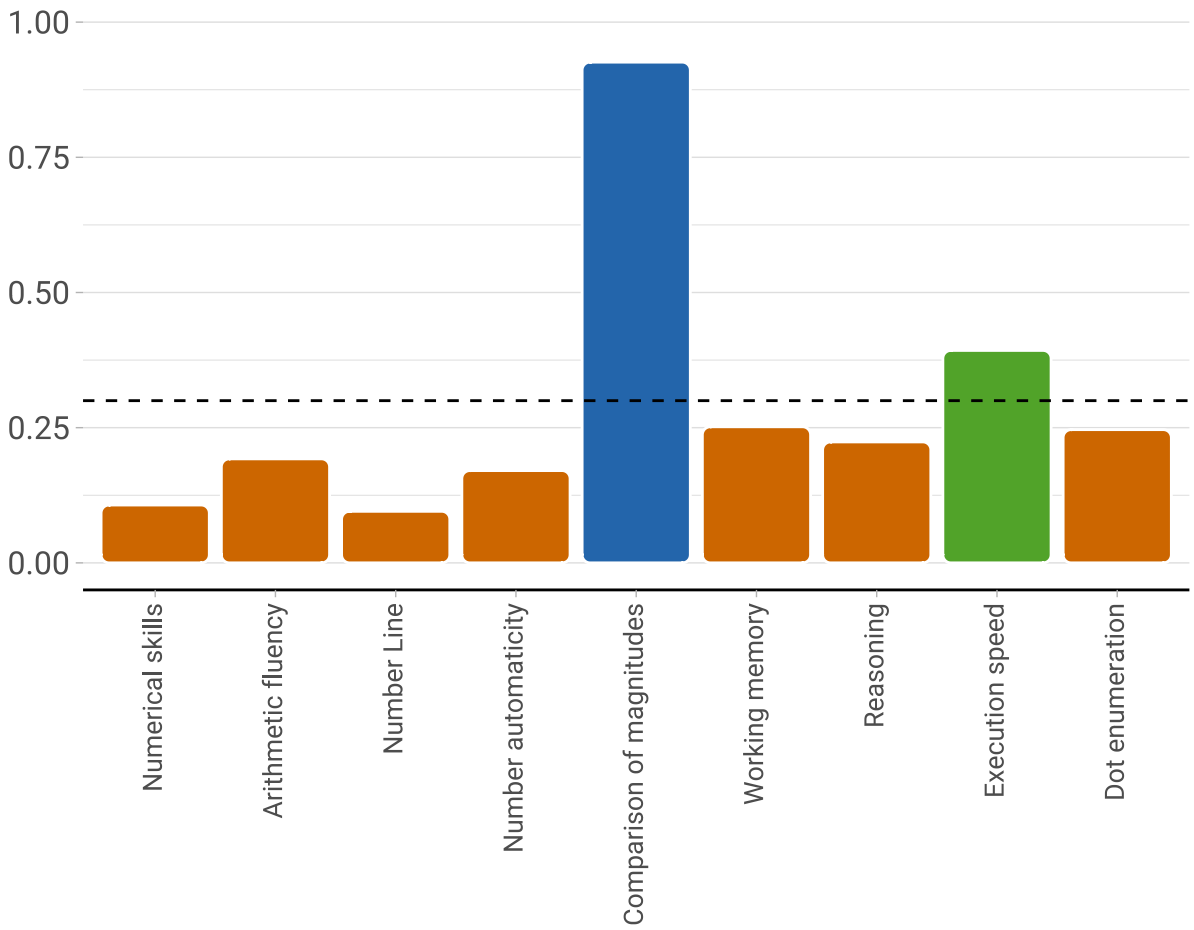
Needs to complete Support Intervention, since they show a very low level of performance in activities related to mathematical skills.

⚠️ Shows a **very low level of attention** during the test or has not understood the activities, as they made errors in 39.2 % of the answers.

Student 13


1.00
0.75
0.50
0.25
0.00
Numerical skills
Arithmetic fluency
Number Line
Number automaticity
Comparison of magnitudes
Working memory
Reasoning
Execution speed
Dot enumeration

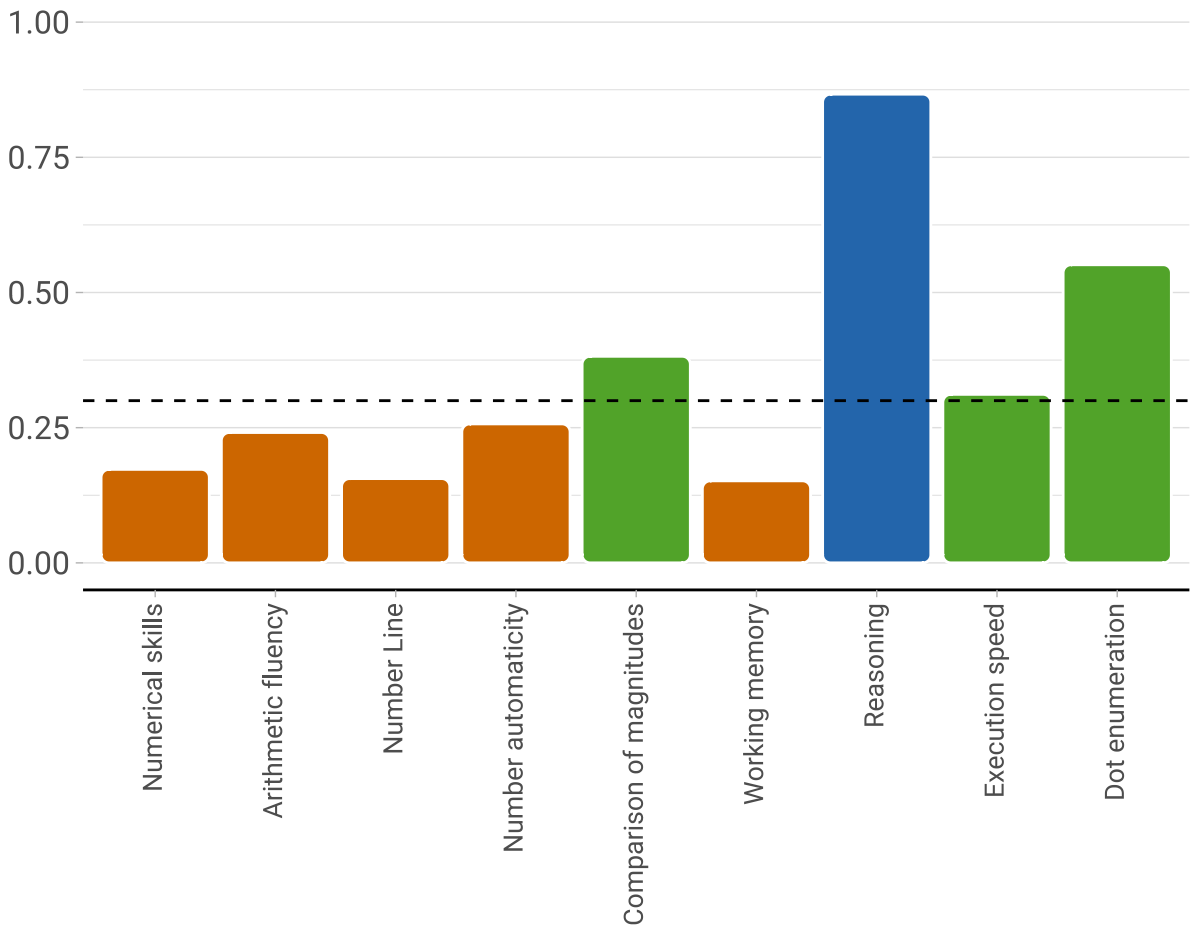
Student 14



Needs to complete Support Intervention, since they show a very low level of performance in activities related to mathematical skills.

In the student profile, we highlight that they show a very low level in Reasoning and Working Memory.

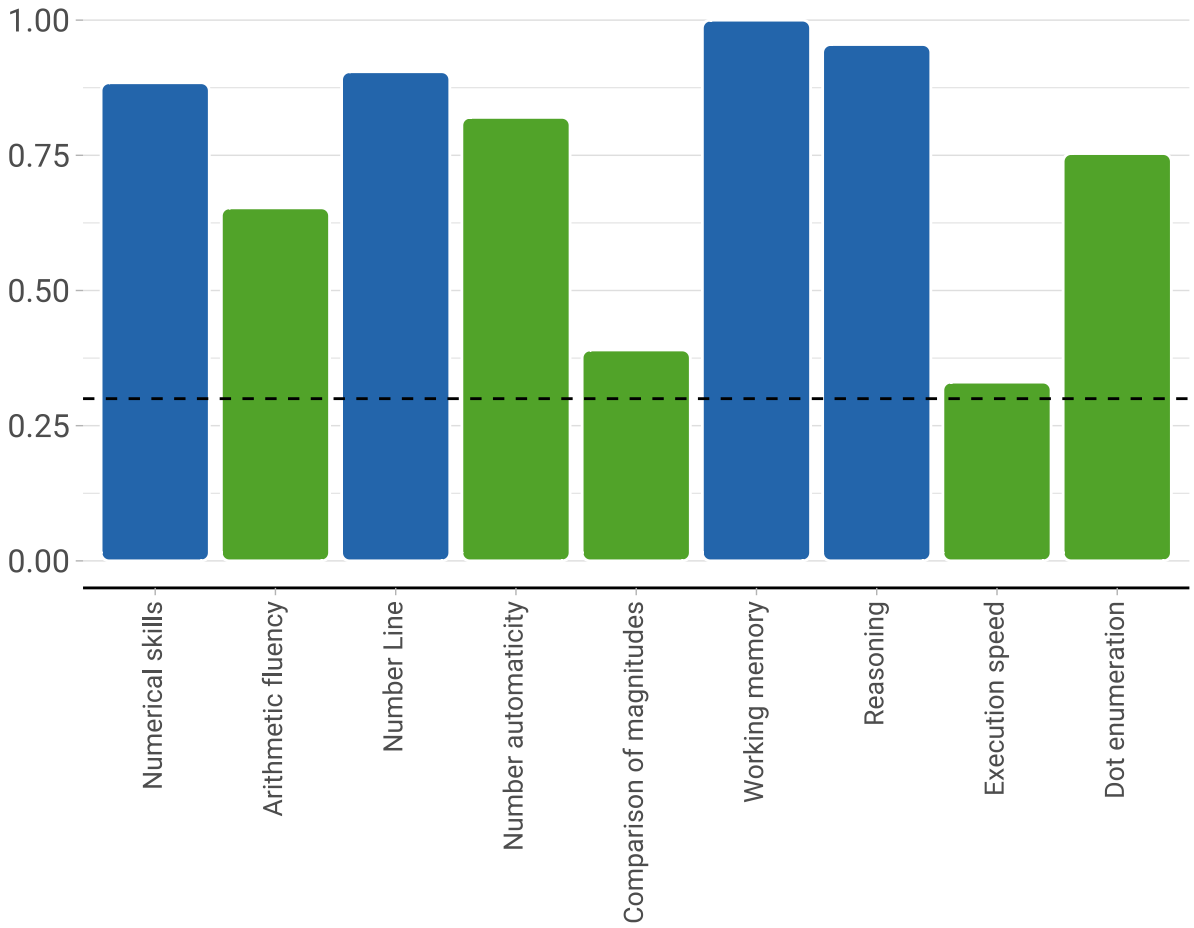
Student 15



Needs to complete Support Intervention, since they show a very low level of performance in activities related to mathematical skills.

In the student profile, we highlight that they show a very low level in Working Memory.

Student 16


1.00
0.75
0.50
0.25
0.00
Numerical skills
Arithmetic fluency
Number Line
Number automaticity
Comparison of magnitudes
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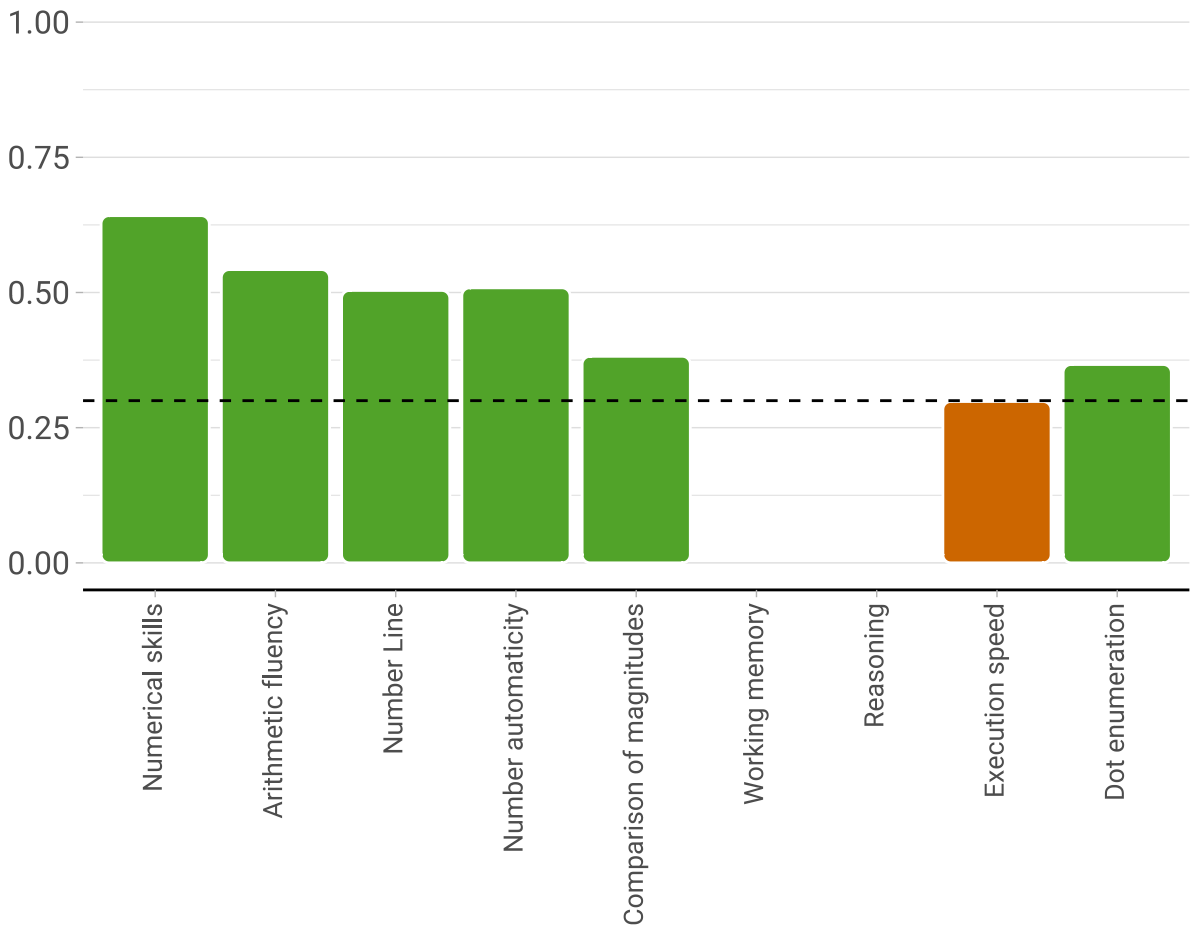
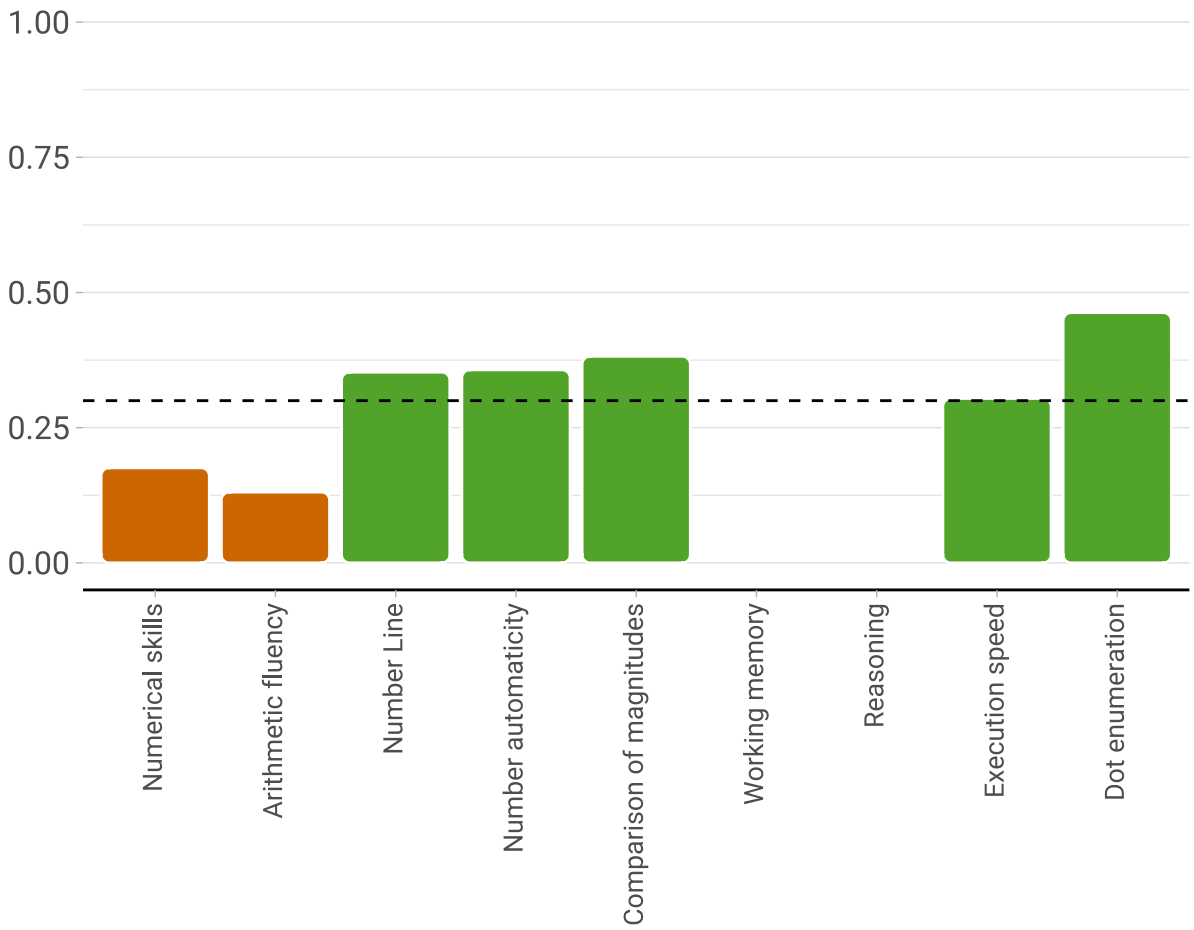
Execution speed
Dot enumeration

Student 17

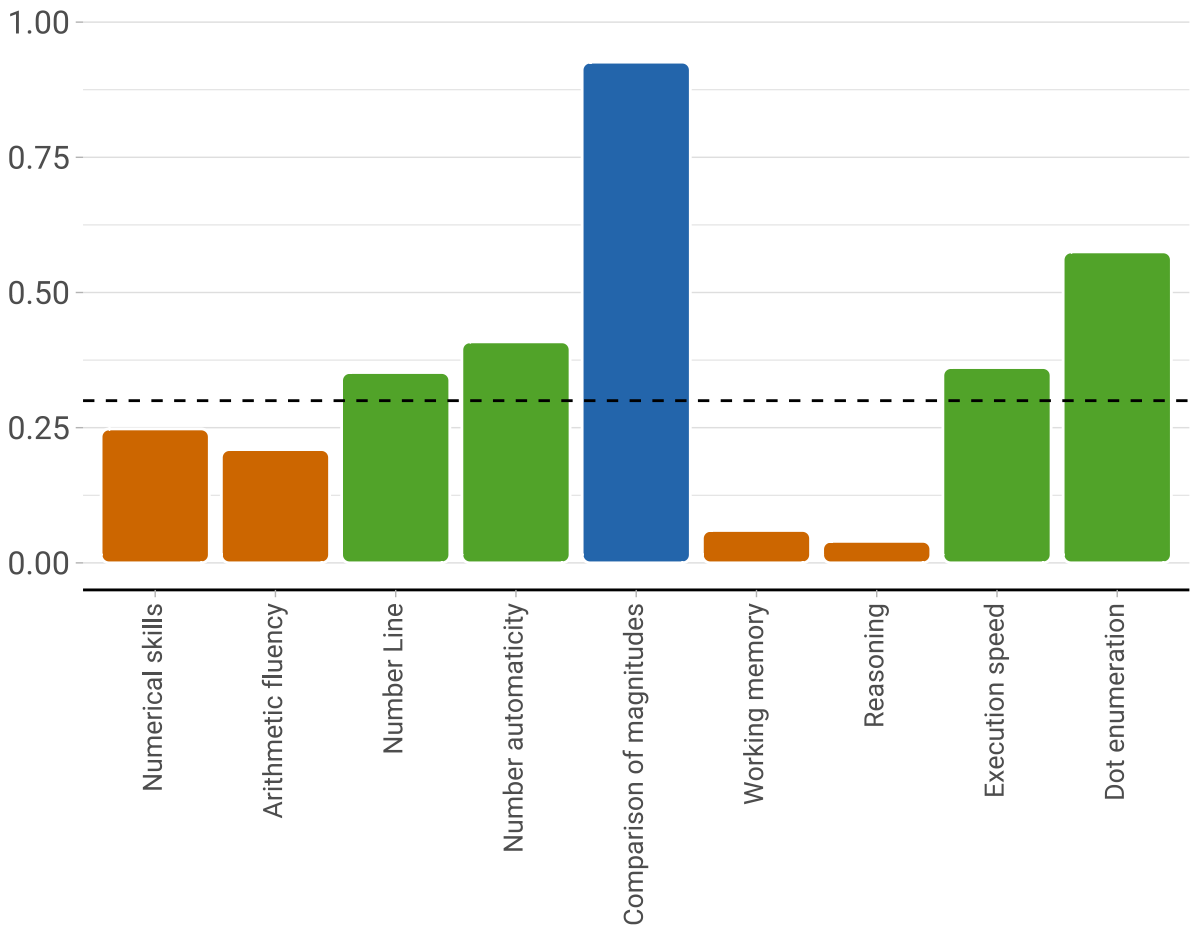

1.00
0.75
0.50
0.25
0.00
Numerical skills
Arithmetic fluency
Number Line
Number automaticity
Comparison of magnitudes
Working memory
Reasoning
Execution speed
Dot enumeration

Student 18



Needs to complete Support Intervention, since they show a very low level of performance in activities related to mathematical skills.

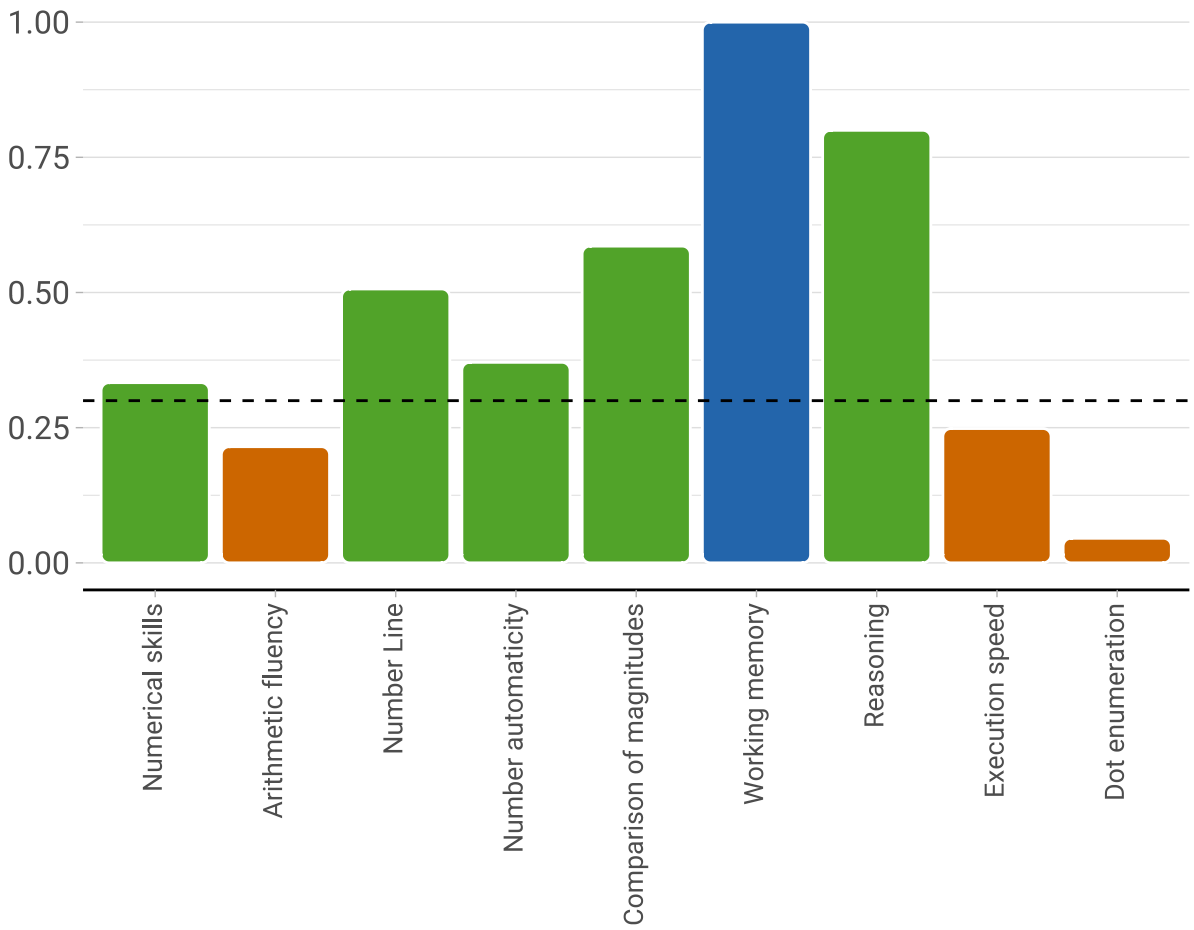
Student 19



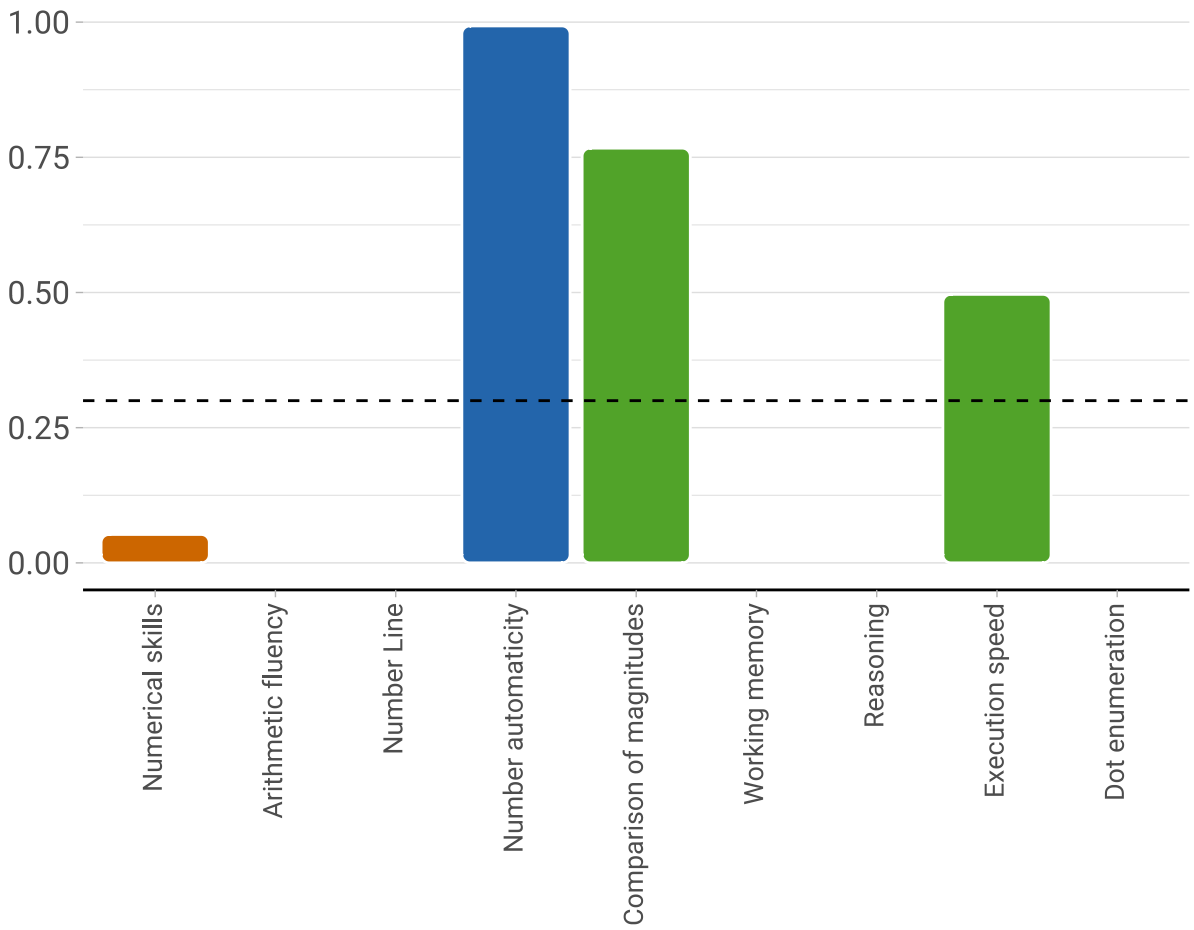
Needs to complete Support Intervention, since they show a very low level of performance in activities related to mathematical skills.

In the student profile, we highlight that they show a very low level in Reasoning and Working Memory.

Student 20


1.00
0.75
0.50
0.25
0.00
Numerical skills
Arithmetic fluency
Number Line
Number automaticity
Comparison of magnitudes
Working memory
Reasoning
Execution speed
Dot enumeration

Student 21



Needs to complete Support Intervention, since they show a very low level of performance in activities related to mathematical skills.

Appendices

The Day of the Test

The results of this report reflect the assessment of a single day under specific conditions and, therefore, it is important to interpret them as indicators of the evaluated factors and not as a definitive measure. Particular circumstances such as motivation, attention to instructions, and the student's personal state at the time of administration can affect the student's performance.

The results may be lower than the student's actual ability if optimal conditions to promote their maximum performance were not present. On the other hand, if they have obtained high results, it indicates that, under some conditions, even if they are not the most common ones, they are capable of showing notable performance. Under no circumstances should psychological or diagnostic conclusions be drawn based solely on the data we present below.

If you want to consult all the available information about the Intervention and see some videos that talk about it, the COSMOS test, and how to analyze the results, you can visit the page https://www.innovamat.com/en/cosmos/.

What is the test like?

The COSMOS test aims to analyze, in an objective and standardized way, the cognitive factors and prior knowledge that influence children's academic performance during their first years of compulsory education. Each of these factors is compared with the universal screening (composed of the results of all children who have taken the test).

It is a universal screening test for detecting learning difficulties in mathematics and is especially focused on the Number and Operations domain. The most relevant activity is arithmetic fluency. In addition to evaluating arithmetic fluency, it also analyzes cognitive precursors and related knowledge, such as magnitude comparison, Number Line knowledge, and automaticity with natural numbers from 0 to 9.

To achieve results with distributions that allow us to ensure the internal validity of the test, the tasks mentioned above are timed, which means students have a maximum time to correctly solve as many items as they can. That's why we include two more activities: one measuring Execution speed, which measures how quickly a child works on the device used for the test, and another measuring visual processing speed, which measures their ability to process and react to visual inputs. The effect of these two tasks gives us a measure of the student's intrinsic processing and reaction speed, which we then take into account when analyzing the timed tests.

Finally, there are two untimed tasks that allow us to measure more general elements in learning: the working memory activity, which measures the ability to maintain and manipulate mental representations and is fundamental in any learning process, and logical reasoning, which measures the ability to deduce and infer patterns—in this case visually—which is essential in mathematical learning. These two activities help us complete the student's cognitive profile for learning mathematics, but they are not used to propose interventions within the framework of this study, as we focus only on Number and Operations.

Frequently Asked Questions

Why is my list of students who need Intervention empty?

This indicates that, according to the comparison with the universal screening, none of your students are below the 30th percentile, and therefore, they do not need Intervention.

Why do some students appear on the Intervention list that I didn't expect?

Some students may be on the list for two reasons:

False positives: a one-time low-performance due to circumstantial factors.

Difficulties in number sense: students who may excel in other areas but have specific challenges with number sense. It is recommended to keep these students in the Intervention if there are doubts.

Could any student be missing from the Intervention list?

The Intervention is focused on Number and Operations, so students with difficulties in other areas (such as reasoning or working memory) may not appear. It is preferable that these students receive different support tailored to their needs.

How do we identify students who need Intervention from the Test?

The Numerical skills factor is the main indicator for determining which students need Intervention. This factor is calculated by combining performance in activities related to numerical skills, assigning a specific weight to each one. The most relevant indicator is arithmetic fluency, although other important activities such as Comparison of magnitudes, Understanding of the Number Line, and Number Automaticity are also considered.

How do we decide if a student needs Intervention?

If the student has low-performance in arithmetic fluency and also in the other three activities, Intervention is recommended.

If a student has low-performance in arithmetic fluency but high performance in the other three activities, Intervention may be optional.

If their performance is slightly above the 30th percentile in arithmetic fluency, they do not necessarily require Intervention, but it can be evaluated according to the teacher's judgment.

How can I explain to parents the need for Intervention for students with good logical reasoning?

Learning mathematics requires both general cognitive skills, such as the ability to reason, and specific skills related to number sense. Some students with good reasoning performance may have specific difficulties with number concepts. Early Intervention in this area can help them balance their skills and improve their mathematical performance over time.

How do we manage students who need Intervention in other areas (working memory, reasoning, etc.)?

Currently, Innovamat does not offer Intervention outside of Number and Operations. We recommend, however, that special attention be paid to these aspects in class and that other teachers also be aware to reinforce these points in an integrated manner.

More information and help

All information about the COSMOS test and Early Intervention can be found on **this page**.

If you have questions about the details of the test or about interpreting the results, **do not hesitate to contact your Innovamat Math Coach.**