



germina

Innovamat
Impact analysis



Impact analysis

Pilot SMERJ 2024

Innovamat

046/03/2025 v3



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Pilot overview

Impact analysis



Pilot

Implementation of a program to transform the teaching of Mathematics



Duration: 1 school year (2024)

Public: 22 classes of 1st and 2nd grades of Elementary School from 5 SMERJ schools

Goals:

1. Improve students' learning outcomes;
2. Increase students' engagement in Mathematics; and
3. Train and qualify educator.





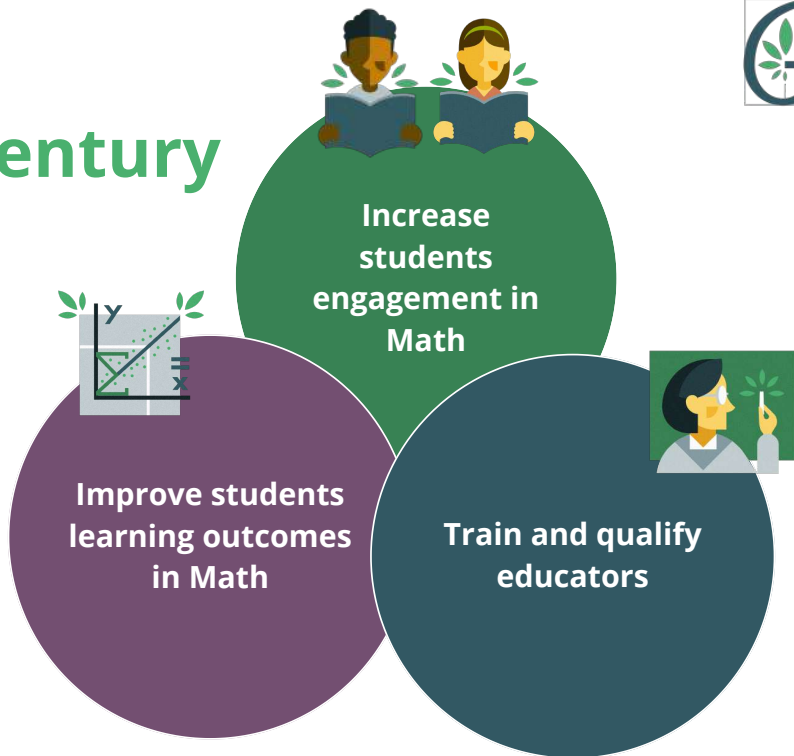
School of the 21st Century

Projet objectives

The program seeks to **implement a new school concept** with innovative pedagogical approaches.

Through the training journey and pedagogical advice for teachers and school management - including providing physical and digital materials - the aim is to make mathematics classes more stimulating and dynamic.

In addition to increasing engagement and improving learning, the program's approach has great potential to reduce aversion to mathematics.





Sample construction

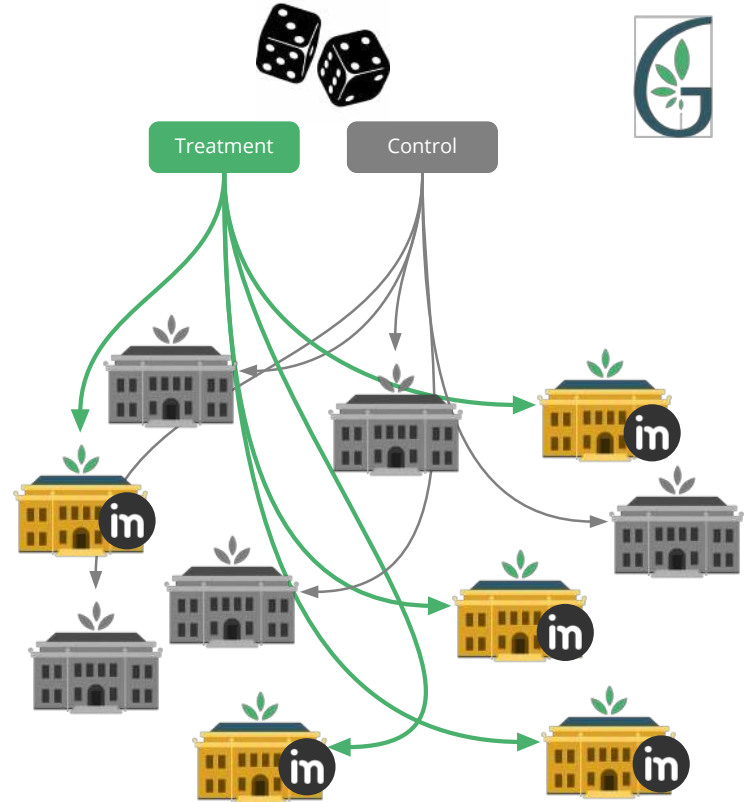
Impact Analysis

Randomization

Impact Analysis | **Sample construction**

In ideal situations, the impact evaluation of an intervention is conducted by analyzing the difference in outcomes between a treatment group and a control group, with participants randomly assigned to either group. This experimental method for assigning treatment and assessing impact is known as a *Randomized Controlled Trial (RCT)*.

However, this ideal framework is not always feasible in practical situations, especially due to the sample size required for conducting valid tests¹.



¹ There are different studies on the minimum sample size required for a valid test, many of which suggest a minimum of around 80 to 100 observations per group — a threshold that is impossible to meet in the context where the group of interest includes 39 schools.



Proposal

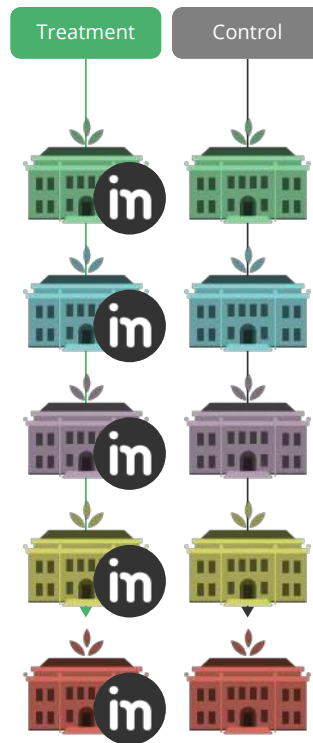
Impact Analysis | Sample construction



The impact evaluation literature recommends using methods that enhance the similarity between the control and treatment groups to ensure the study's validity¹.

In this case, the recommended approach is the adoption of a stratified random assignment strategy, which consists of:

- Dividing schools into statistical clusters based on the most relevant characteristics of the program;
- Randomly assigning a group of schools within each cluster to the treatment group².



¹ Besides these methods, other approaches are used in impact analysis, such as the "pretest-posttest design," where differences observed after the intervention are adjusted for differences found before the intervention (e.g., Difference-in-Differences - DID).

² Since the intended treatment group is smaller than the control group (8/39), the assignment should be done proportionally.

Clusters

Impact Analysis | **Methodology**

The clusters were formed using K-Means¹ clustering based on data from all active municipal schools in Rio de Janeiro.

Of the 790 schools, 136 were excluded because they did not have the minimum required data. At the time of cluster construction, the scope was expanded to include all SMERJ schools, aiming to prevent model overfitting² to the context of the GETs that offer Early Years, given that they are part of a small group of schools (39).

The data was normalized, standardized, or had specific functions applied, such as logarithmic transformation, as needed, to ensure better cluster definition and equity among variables.



All the data used for the construction of the clusters comes from public databases provided by INEP. Based on correlation analyses and sensitivity tests, the variables selected for analysis were:

- **SAEB_2021** – Standardized average score, Early Years (2021);
- **FLUXO_2021** – Student Promotion Indicator, Early Years (2021);
- **DSU_AI_2022** – Percentage of Teaching Positions with Higher Education Degree, Early Years (2022);
- **HAD_AI_2022** – Average Daily Class Hours, Early Years (2022);
- **AFD1_AI_2022** – Percentage of teachers in the superior group of the teacher training adequacy indicator, Early Years (2022);
- **MEDIA_INSE** – Socioeconomic Level Indicator (2021);
- **IN_INTERNET_APRENDIZAGEM** – Internet Access - For use in teaching and learning processes (2022);
- **PER_BBI** – Percentage of students self-declared as Black, Brown, or Indigenous (BBI) among the total number of students who made a self-declaration (2022);
- **ALUNOS_DOCENTE_AI** – Number of students per teacher, Early Years (2022);
- **ALUNOS_TURMA_AI** – Number of students per class, Early Years (2022).

¹ K-means is a clustering method that organizes data based on the similarity of their characteristics. In this case, it was applied to identify patterns and create groups of similar schools.

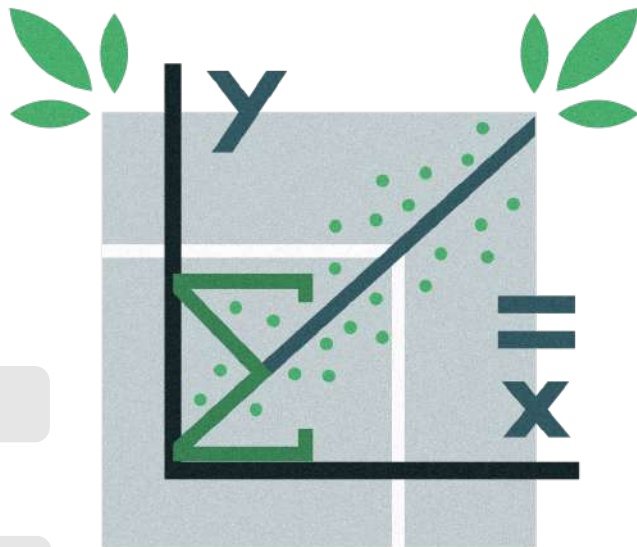
² Overfitting of the statistical model in the case of small or biased samples, reducing the generalizability of the analysis.



Formed Clusters

Sample construction | **Results and Recommendations**

- A** Smaller schools, lower percentage of Black, Brown, and Indigenous students (BBI), better teacher training indicators, fewer students per teacher and per classroom, better connectivity, and higher academic performance.
- B** Smaller schools, higher % of BBI students, higher teaching workload (CH), and low academic performance.
- C** Larger schools, with lower teacher qualification indicators.
- D** Larger schools, higher % of BBI students, lower teaching workload (CH), and low academic performance.
- E** Schools with insufficient data.



The analytical panel of cluster centroids is presented on the next page.

Centroides

Sample construction | Results and Recommendations



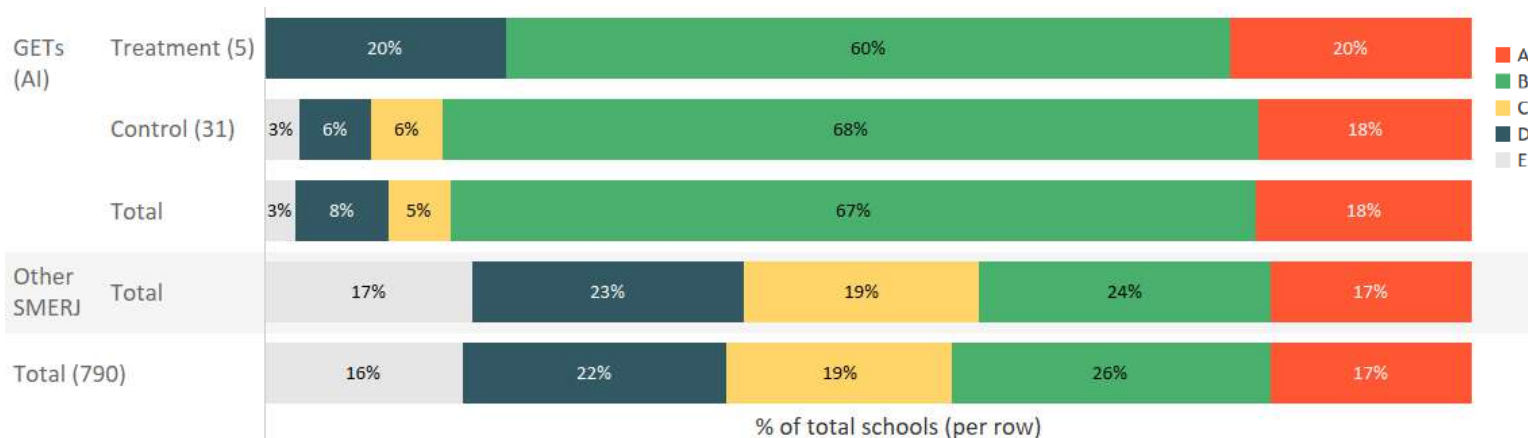
Variable	Total	Cluster			
		A	B	C	D
AFD1_AI_2022	0,51	0,53	0,53	0,38	0,50
ALUNOS_DOCENTE_AI	17,44	14,44	14,03	20,40	21,33
ALUNOS_TURMA_AI	20,39	18,83	19,82	20,51	20,65
DIR_ANOS_TX_RESP_Q012	7,72	6,56	7,20	10,19	6,60
DSU_AI_2022	0,65	0,67	0,66	0,58	0,65
FLUXO_2021	0,67	0,67	0,67	0,67	0,67
HAD_AI_2022	3,80	3,76	4,86	3,35	3,14
IN_INTERNET_APRENDIZAGEM	0,71	0,73	0,69	0,71	0,70
MEDIA_INSE	3,30	3,43	3,22	3,30	3,25
PER_BBI	0,45	0,39	0,48	0,45	0,46
SAEB_2021	3,88	4,26	3,70	3,89	3,67

Elaborated by: Germina. Source: INEP, Basic Education Assessment System - SAEB (2021); School Census (2022), e Educational Indicators (2022).

Clusters



Impact Analysis | Sample construction



Elaborated by: Germina. Source: INEP, Basic Education Assessment System - SAEB (2021); School Census (2022), e Educational Indicators (2022).

The distribution balance of schools by interest grouping is presented above.

- Stratification criteria: Maximizing equivalence between proportions.
- Clusters A and B are well represented, maintaining proportionality between the population and the sample.
- Clusters C and E are underrepresented among GETs, so they are not included in the sample.



About the Impact Analysis

Work Plan

Impact Analysis | Scope



Stages Proposed at the Start of the Project

At the beginning of the project, the following steps were proposed to develop the impact analysis:

- 1. Theory of Change** - understanding the intended transformations of the program and structuring its objectives.
- 2. Quantitative Analysis** - assessing the evolution of student performance based on evaluation data from SMERJ schools.
- 3. Qualitative Analysis** - evaluating the effectiveness of the program in achieving its two key goals: student engagement and teacher training.
- 4. Equity** - Germina integrates an equity perspective in its impact evaluations whenever possible, verifying whether learning distribution helps address social inequalities.
- 5. Consolidation** - producing a comprehensive report (executive summary) that consolidates the program's impact analysis, integrating all previous assessments.



Theory of Change Impact Analysis

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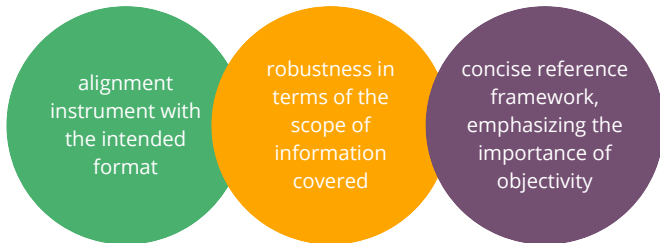


Theory of Change

What? Why?

The ToC is a tool aimed at understanding the transformations intended by the project and the structuring of its actions and respective results. By capturing programmatic intentions, the ToC **guides more assertive choices during implementation and the use of evaluation methods**. This was the starting point for the construction of the impact assessment, aiming to building a solid basis for analysis, aligned with the design and expectations established.

References were sought that would guarantee:



Three-step diagnostics:



Mapping of the theoretical framework and benchmark



Information gathering:

a) Interviews with key stakeholders involved in the formulation and implementation of the pilot; and, **b)** Document analysis of the provided materials and content available on the website.



Validation Rounds with the involved teams to ensure accuracy and coherence.



Products

Four key deliverables proposed by Innovamat were mapped to guide the pilot toward an effective implementation:

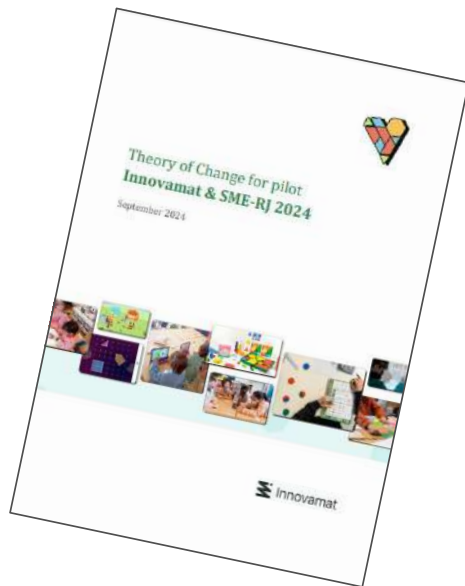
- i. contemporary **pedagogical framework**;
- ii. **teaching materials** for use in the classroom;
- iii. **Digital Educational Resources (RED)**; and,
- iv. **continuous professional development** for teachers and lead educators.

The expected outcomes for each of these components were organized in the form of trials →

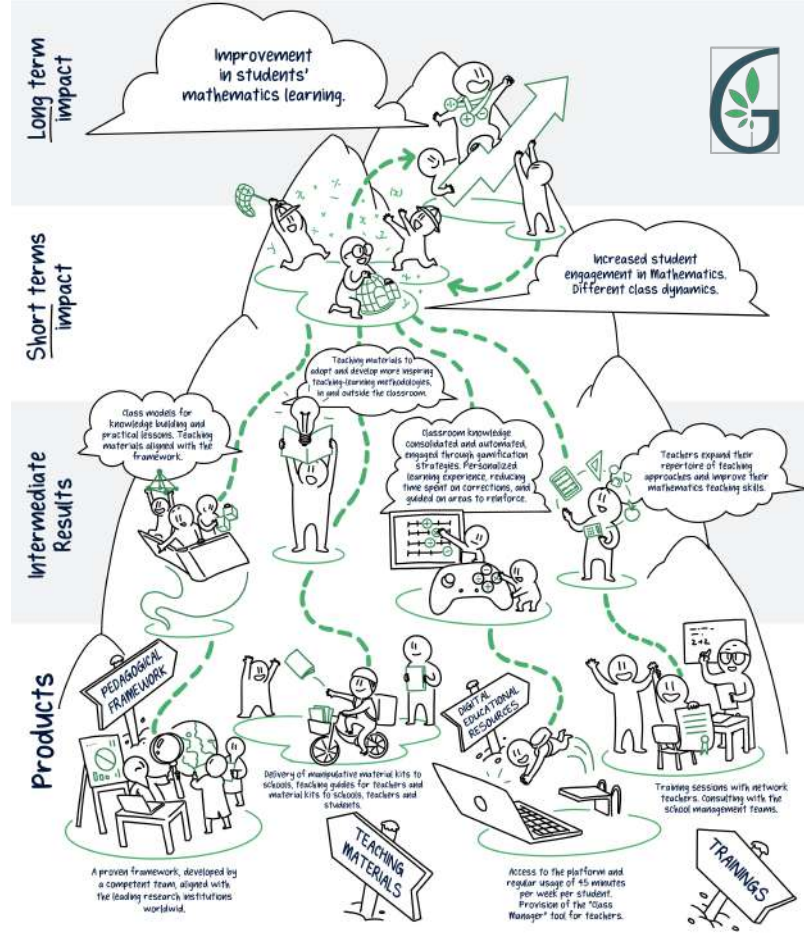




On the right is presented the synthetic view of the **Theory of Change**



The **full document** (Annex 01) can be accessed through these links:
[portuguese](#) or [english](#).





Methodological Plan Impact Analysis



Methodology

In light of the Theory of Change, the impact evaluation of the Innovamat program was constructed based on **mixed methods**, incorporating quantitative and qualitative approaches to analyze school performance and engagement.

The analysis was conducted through three main activities:

- **Interviews** with implementers;
- Administration of a **survey** to teachers and principals about mathematics teaching; and
- **Quantitative analysis** of the Regional Diagnostic Activities (ADR) – bimonthly assessments conducted by SMERJ.

This multi-instrumental approach provides a more comprehensive view of students and the potential impacts of the program on participating schools, aligning with the movements anticipated in the ToC.

The technical details of the methodologies employed are available in the Research Project ([Annex 02](#)), approved by CEP/Conep system under the code 79432724.0.0000.5268.



Interviews

- 8 interviews with implementing agents (direction, coordination, head teacher and assistant teacher).
- Discourse analysis, grouping and classification using an abductive strategy.



Survey

- Application of structured surveys to teachers and coordinators of the treatment and control groups.
- Use of quantitative methods to measure changes in pedagogical practices, use of resources and school engagement based on the responses.



ADRs

- Analysis of student performance data from quarterly assessments (ADRs).
- Use of quasi-experimental methods, such as difference-in-differences (DID) multilevel regression and Propensity Score Matching (PSM).
- Control of socioeconomic variables and school characteristics associated with performance.



Qualitative Analysis Initials

Based on the interviews and survey, classifications were assigned to each stage and product described in the Theory of Change, based on the following reference:



The goals were achieved

Indicates that the expected objective was met according to the project design, and the resulting outcomes are expected to be positive.



The objectives were partially achieved

Indicates that the expected objective was partially met, which may compromise the expected results.



The objectives were not achieved

Indicates that the main objectives for the stage were not met, and there are no expectations that positive results will be associated with the project.



If you didn't add yeast, you can't expect the cake to rise; if it did rise, it wasn't because of the yeast.



Results Impact Analysis

Analysis index

Impact Analysis | Results



1. Interview with Implementers



2. Survey for Teachers and Lead Educators



3. Regional Diagnostic Activities



1. Interview with Implementers Impact Analysis



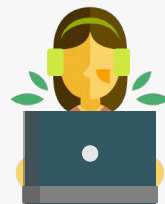
Methodology

Impact Analysis | 1. Interview with Implementers

A total of **8 interviews were conducted with implementing agents** (school administration, coordination, lead teacher, and assistant teacher) via video call, with an expected duration of 30 minutes.

The interviews were carried out by the Germina team, following a semi-structured script ([Annex 03](#)), with anonymized records of the content shared by the interviewees.

The content was grouped and classified using an inductive strategy based on the Theory of Change (ToC) from the pilot project. The inferences were then organized and structured.



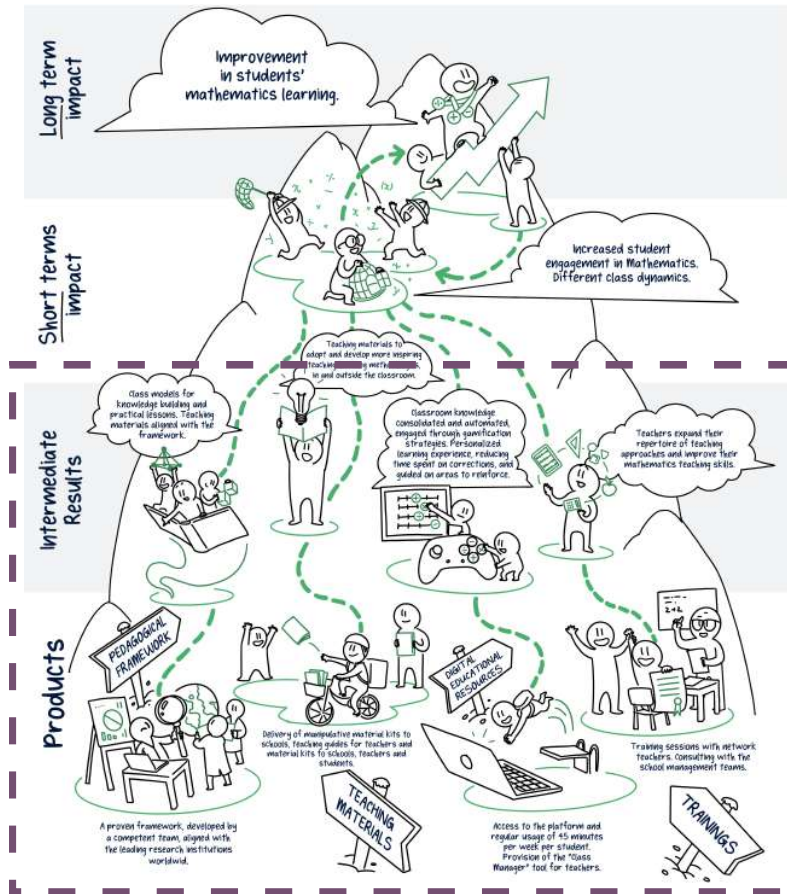
Objective: capture the school staff's perspective on the program's products, outcomes, and adaptations.

Starting the journey

Mountain Base

Teachers with greater access to materials, resources, and training

The interviews explore how the pedagogical foundations and initial conditions for project implementation — represented by the mountain base in the Theory of Change — are being perceived and experienced by teachers. This phase focuses on **building solid practices and preparing for the challenges of the educational journey.**



Intermediate Results



Adoption of Lesson Models for Knowledge Building and Hands-On Learning



Use of Comprehensive Teaching Materials



Expansion of Teachers' Repertoire of Pedagogical Approaches



Enhancement of Mathematics Teaching Skills



Use of More Engaging Teaching and Learning Methodologies



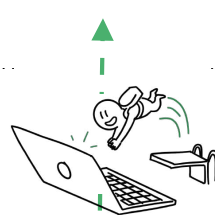
A.1. More engaged students through gamification



A.2. Consolidation of knowledge acquired in the classroom



B. Effective monitoring of individual learning experiences



Products



Provision of a validated reference framework based on research

Pedagogical Framework



Training with Network Teachers



Advisory support with the school team

Continuous Professional Development



Delivery of manipulable materials kits to schools



Delivery of teaching guides for teachers



Delivery of material kits to teachers and students

Teaching Materials



A. Students with access to the InnovaApp and regular weekly use (45 minutes)



B. Platform availability "Class Manager"

Digital Educational Resources



Pedagogical Framework

Impact Analysis | 1. Interview with Implementers

Intermediate Results



Adoption of Lesson Models for Knowledge Building and Hands-On Learning

"I learned to use more playful approaches in the classroom."

"The teaching methodology grabs children's attention, helping them learn in a different way, become critical thinkers, and consider alternative perspectives.."

"When exams come, the traditional method is required."



Use of Comprehensive Teaching Materials

"At first, it was complicated because it takes time to get organized."

"There are three books, and we haven't even reached the middle of the second one."

"It progresses differently from the skills required by the education network."

Products



Provision of a validated reference framework based on research

"It's complicated to step away from the usual routine of what we do every day."

"It's one more responsibility, and we weren't prepared for it."

"It's my favorite moment at school. It's like watching the children learn to crawl."

"Students are more interested in mathematics. They enjoy finding the path to reach their goal."



Continuous Professional Development

Impact Analysis | 1. Interview with Implementers

Intermediate Results



Expansion of Teachers' Repertoire of Pedagogical Approaches

"I moved away from more traditional methods and started using more playful approaches in the classroom."

Using Classroom Dynamics in Geography to Teach Spatial Awareness

"We had the idea to replicate it for other classes." (e.g., a board with odd and even numbers)



Enhancement of Mathematics Teaching Skill

"There are many things I learned to do that I never imagined, as I come from a traditional background."

"It's my favorite moment at school. It's like watching the children learn to crawl."

"It's a different way of seeing mathematics."

Products



Training with Network Teachers

"The training sessions are very good. They challenge our background, not just as teachers but also as former math students."

"It's complicated to step away from the usual routine of what we do every day."

"More training is needed. For example, identifying the difficulties from the semester to structure a training session."



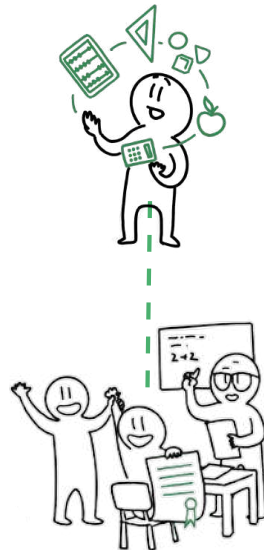
Advisory support with the school team

"The advisory support helped us understand how to use the material."

"It helps with adjustments in lesson planning to select content and make connections according to assessments and the network's materials."

"He is always willing to answer all questions."

"Some people have doubts but don't ask them."



Teaching Materials

Impact Analysis | 1. Interview with Implementers

Intermediate Results



Use of More Engaging Teaching and Learning Methodologies

"Students love it!"

"They are learning even more than with the textbooks."

"It takes a long time to get everyone's attention."

"The class really enjoys the manipulative materials. It's their favorite part."

"I struggle to move forward and use everything. I believe it's because of the number of children."

Products



Delivery of manipulable materials kits to schools

"The material is rich and comprehensive. It provides a well-detailed step-by-step, which makes teaching easier."

"It's important to understand the material to teach mathematical concepts beyond just calculations."



Delivery of teaching guides for teachers

"Manipulative materials are amazing!"

"I received a quantity that allows me to use it with the entire class."

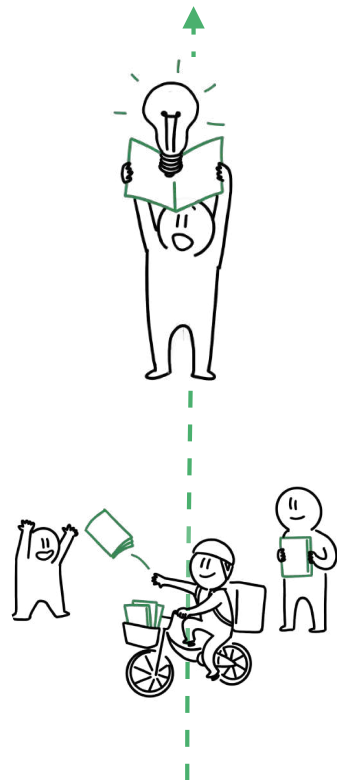


Delivery of material kits to teachers and students

"Students are outstanding! I hand them the notebook, and I don't even need to say anything—they master everything."

"Sometimes, the content in the physical materials is different from the digital materials."

"A major challenge is the extensive amount of material."



Digital Educational Resources

Impact Analysis | 1. Interview with Implementers

Intermediate Results



A.1. More engaged students through gamification

"The app is amazing. They love it and get 'crazy' to move on to the next level."

"Students start the week asking when Innovamat will be."

"Some don't want to play anymore because it got too hard. This comes from a greater learning difficulty."



A.2. Consolidation of knowledge acquired in the classroom

"Students had to learn how to use the computer."

"When they return, they start a different game. Sometimes, the average score drops because the app crashed."

"Some days, everything is prepared, but when they turn on the computer, there's no internet."



B. Effective monitoring of individual learning experiences

"Sometimes, in the whole group, it seems like the class is doing well, but when you look individually, the child hasn't absorbed everything."

"I can see what needs reinforcement with the students and don't have to waste time correcting."

"It's hard to give individual attention in large classes."

Products



A. Students with access to the InnovaApp and regular weekly use (45 minutes)

"Each student only uses it for 20 minutes in a 1-hour class.."

"If each student had a [computer/tablet], they would progress more."

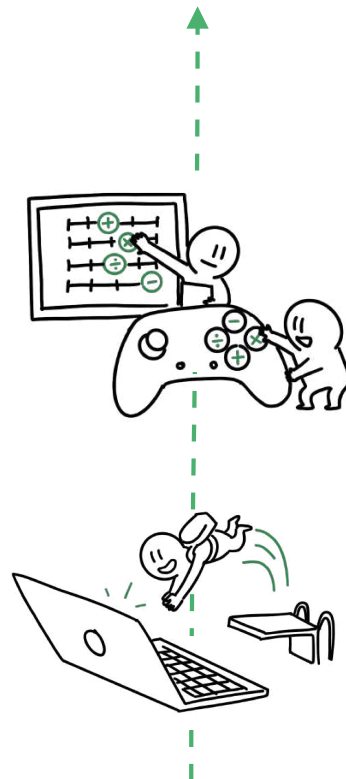
"Rotation has become a routine. They use it so other subjects can also access the computers."



B. Platform availability
"Class Manager"

"Some teachers struggle to access the app on their own and need help."

"Teachers rarely used the Classroom Manager due to misalignment with the curriculum."





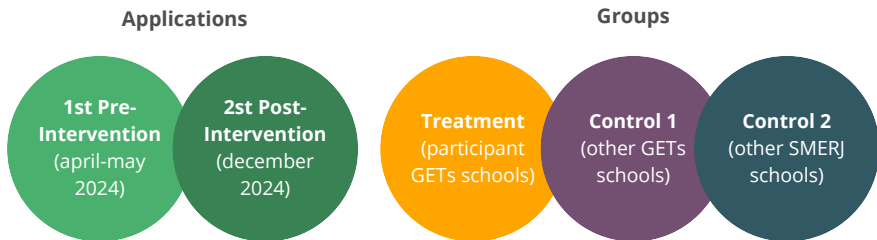
2. Survey for Teachers and Lead Educators Impact Analysis



Methodology

Impact Analysis | 2. Survey for Teachers and Lead Educators

As outlined in the Theory of Change (ToC), the Innovamat intervention project relies on teacher adherence for the pedagogical framework, methodologies, and didactic tools to be effectively implemented in the classroom. With this in mind, a questionnaire ([Annex 04](#)) was developed to capture evidence of teachers' adherence to the program's agenda, considering their teaching practices and perspective on student outcomes.



Objective: map pedagogical practices, assess the use of educational resources, and understand teachers' perceptions of student engagement.

Thematic Components:

1. Respondent profile
2. Pedagogical framework
3. Teaching materials
4. Digital Educational Resources
5. Continuous professional development



Respondent sample

The questionnaire was administered digitally through SMERJ's official channels, with a "Letter of Invitation" sent to the schools ([Annex 05](#)).



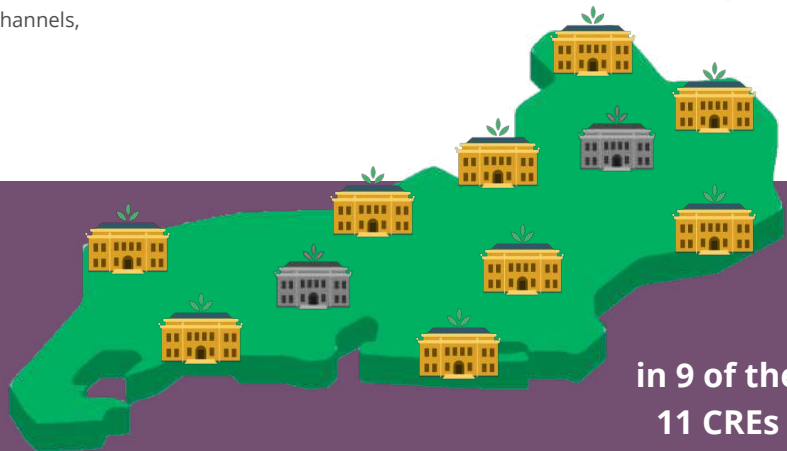
306
Schools



37
GETs



881
Teachers

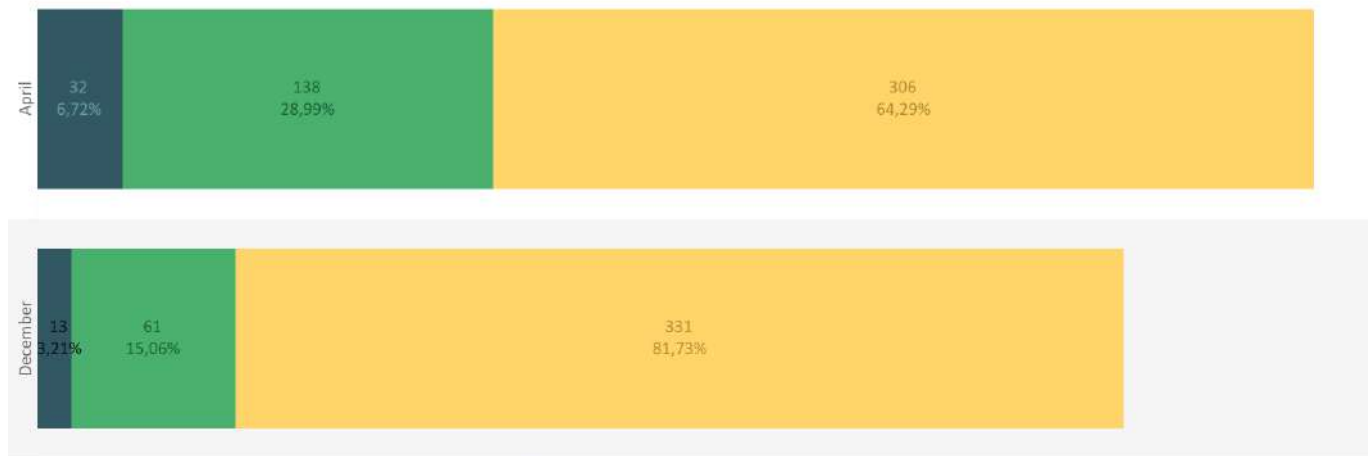


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11 CREs**



01. Percentage of Total Respondents per Group in the Questionnaire for Teachers of the Municipal Department of Education of Rio de Janeiro

Percentage of the Total Respondents per Group



Developed by: Germina. Source: Questionnaire administered to teachers of the Municipal Department of Education of Rio de Janeiro (April to May and December 2024). Filter: Teachers who teach 1st and/or 2nd grade of *Ensino Fundamental*.

Color key

- Control 2 (other)
- Control 1 (other GETs)
- Treatment

* Among the 5 schools where the program was implemented, 3 applied it to all 1st and 2nd-year classes. In the other two schools, the program was implemented in about half of the classrooms (11 out of 20). The survey responses could not differentiate between teachers from treated and non-treated classrooms in these two mixed schools, as the survey was designed to be answered anonymously by teachers. As a result, the observed program effects in the following analysis may be underestimated, due to sample contamination — where some control group teachers may have been included in the treatment group responses.



Precision and Significance

Margin of Error:



Validity of Variations:

For each question in the questionnaire, a T-Test was used to determine the statistical significance of variations: (1) Between treatment and control groups in the first application – to identify pre-existing differences before the program, and (2) Between different applications within each group – to determine whether observed changes from the beginning to the end of the intervention were statistically significant.

Significance level is indicated with the following references:



No significance: Differences that are not statistically significant remain unclassified.

Summary: Survey for Teachers and Lead Educators



Short-Term
Impact



Teacher Engagement



Student Engagement

Intermediate
Results



Adoption of lesson models for knowledge building and hands-on-learning



Use of comprehensive teaching materials



Pedagogical Framework



Expansion of teachers' repertoire of pedagogical approaches



Enhancement of mathematics teaching skills



Continuous Professional Development



Use of more engaging teaching and learning methodologies



Teaching Materials



A.1. More Engaged Students Through Gamification



A.2. Consolidation of the knowledge obtained in class



B. Effective monitoring of individual learning experiences



Digital Educational Resources

Summary: Survey for Teachers and Lead Educators

Pedagogical Framework

***** I present a summary of the recently learned content:** The proportion of positive responses grew from 77,4% to 100,0% (22,6 p.p. ***), while the control group fluctuated from 91,1% to 91,8% (0,7 p.p.). The difference in evolution between the treatment and control group 1 was 21,9 p.p. ***.

I refer to a real-life or work-related problem to demonstrate why the new knowledge is useful: The proportion of positive responses fluctuated from 96,8% to 100,0% (3,2 p.p.), while the control group fluctuated from 97,1% to 98,3% (1,3 p.p.). The difference in evolution between the treatment and control group 1 was 2,0 p.p.

Textbook provided by the school: The proportion of positive responses grew from 87,1% to 100,0% (12,9 p.p. **), while the control group grew from 87,7% to 91,8% (4,1 p.p. ***). The difference in evolution between the treatment and control group 1 was 8,8 p.p.

Other materials provided by the school: The proportion of positive responses fluctuated from 87,1% to 84,6% (-2,5 p.p.), while the control group grew from 93,1% to 100,0% (6,9 p.p. ***). The difference in evolution between the treatment and control group 1 was -9,4 p.p.

Continuous Professional Development

*****I have discussions with colleagues about Development of specific students:** The proportion of positive responses grew from 36,7% to 53,9% (17,2 p.p. ***), while the control group fluctuated from 49,3% to 50,8% (1,6 p.p.). The difference in evolution between the treatment and control group 1 was 15,6 p.p. ***.

Using new technologies to support your activities: The proportion of positive responses fluctuated from 89,3% to 92,3% (3,0 p.p.), while the control group grew from 83,3% to 91,8% (8,5 p.p. ***). The difference in evolution between the treatment and control group 1 was -5,4 p.p.

Improving teaching methodologies: The proportion of positive responses fluctuated from 92,9% to 100,0% (7,1 p.p.), while the control group grew from 91,6% to 96,7% (5,1 p.p. ***). The difference in evolution between the treatment and control group 1 was 2,0 p.p.

****I believe my knowledge of mathematics is sufficient for the grade level I teach:** The proportion of positive responses fluctuated from 93,6% to 84,6% (-8,9 p.p.), while the control group grew from 87,4% to 91,4% (4,0 p.p. ***). The difference in evolution between the treatment and control group 1 was -12,9 p.p. **.

Educational Resources

*****I assign tasks/exercises for which there is no obvious solution:** The proportion of positive responses fluctuated from 38,7% to 38,5% (-0,3 p.p.), while the control group grew from 33,1% to 45,8% (12,7 p.p. ***). The difference in evolution between the treatment and control group 1 was -12,9 p.p. ***.

I assign tasks/exercises that require critical thinking from students: The proportion of positive responses grew from 74,2% to 84,6% (10,4 p.p. *), while the control group grew from 82,4% to 85,3% (2,9 p.p. **). The difference in evolution between the treatment and control group 1 was 7,5 p.p.

****I allow students to use ICT (Information and Communication Technology) for projects or classroom tasks:** The proportion of positive responses fluctuated from 34,5% to 38,5% (4,0 p.p.), while the control group decreased from 43,6% to 36,7% (-6,9 p.p. ***). The difference in evolution between the treatment and control group 1 was 10,9 p.p. **.

****Use of Digital games:** The proportion of positive responses grew from 58,1% to 84,6% (26,6 p.p. ***), while the control group grew from 65,4% to 78,7% (13,3 p.p. ***). The difference in evolution between the treatment and control group 1 was 13,3 p.p. **.

Engagement

***The students in this class help create a pleasant atmosphere for learning:** The proportion of positive responses grew from 76,7% to 92,3% (15,6 p.p. **), while the control group grew from 70,4% to 73,8% (3,4 p.p. ***). The difference in evolution between the treatment and control group 1 was 12,2 p.p. *.

I believe my students have a certain level of mathematical ability that they cannot change: The proportion of positive responses grew from 41,9% to 50,0% (8,1 p.p. *), while the control group grew from 33,1% to 41,7% (8,6 p.p. ***). The difference in evolution between the treatment and control group 1 was -0,5 p.p.

****They respect the agreements established in the classroom:** The proportion of positive responses grew from 68,8% to 84,6% (15,9 p.p. ***), while the control group fluctuated from 64,4% to 65,6% (1,1 p.p.). The difference in evolution between the treatment and control group 1 was 14,7 p.p. **.



Pedagogical Framework

2. Survey

Pedagogical Framework

Impact Analysis | 2. Survey for Teachers and Lead Educators

Intermediate
Results

Question: Regarding teaching this specific class, how often do you do the following?



A. Adoption of Lesson Models for Knowledge Building and Hands-On Learning

I present a summary of the recently learned content.
+21,9 p.p. ***

I explain how previous lessons relate to the current lesson.
+18,4 p.p ***

I refer to a real-life or work-related problem to demonstrate why the new knowledge is useful.
+2 p.p.

I take students outside the classroom for activities.
+6,7 p.p.

Question: Throughout this year, have you used the following resources in your classes?



B. Use of comprehensive teaching materials

Textbook provided by the school.
8,8 p.p

Other materials provided by the school.
-9,4 p.p

Physical or digital manipulatives.
+7,8 p.p

Materials created by me.
+5,9 p.p

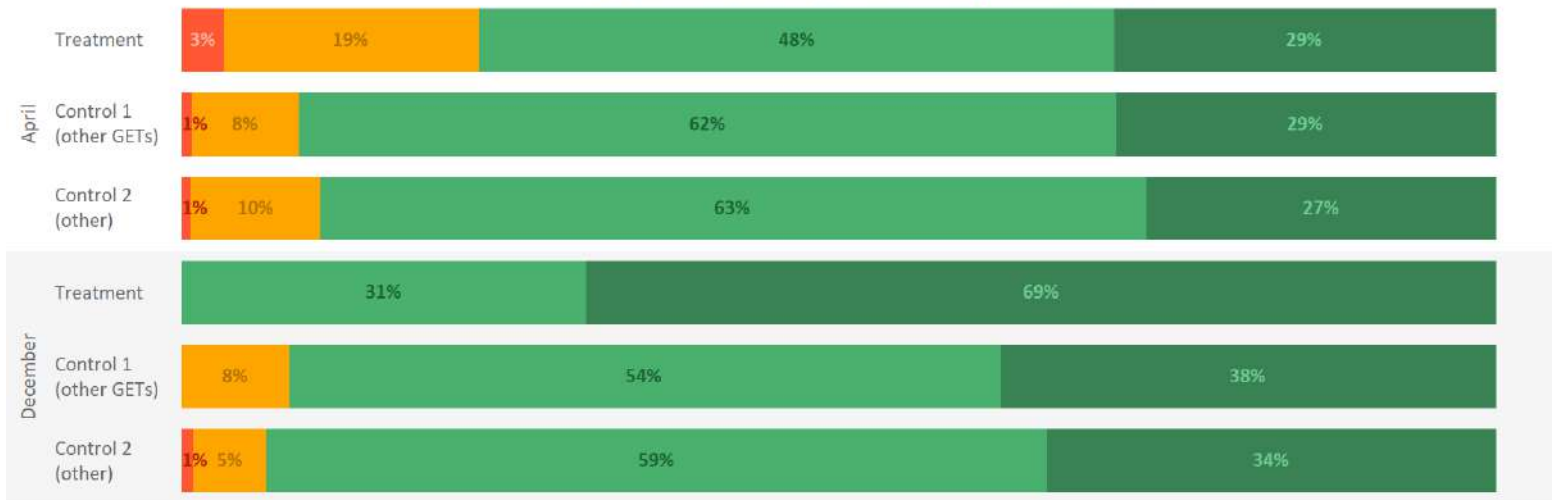


Values presented as '+X p.p.' represent the difference in variations between groups, where 'X' is the difference in percentage points. The symbols (*, **, ***) indicate the level of statistical confidence: * for 90%, ** for 95%, and *** for 99%. The absence of a symbol means the difference is not significant.

02. Pedagogical Framework | Adoption of Teaching Models for Knowledge Construction and Practical Lessons

Distribution of the Percentage of Total Responses per Group According to the Application for the Item:

(a) I present a summary of the recently learned content.



Developed by: Germina. Source: Questionnaire administered to teachers of the Municipal Department of Education of Rio de Janeiro (April to May and December 2024). Filter: Teachers who teach 1st and/or 2nd grade of *Ensino Fundamental*.

Color key

- Always
- Frequently
- Rarely
- Never or almost never

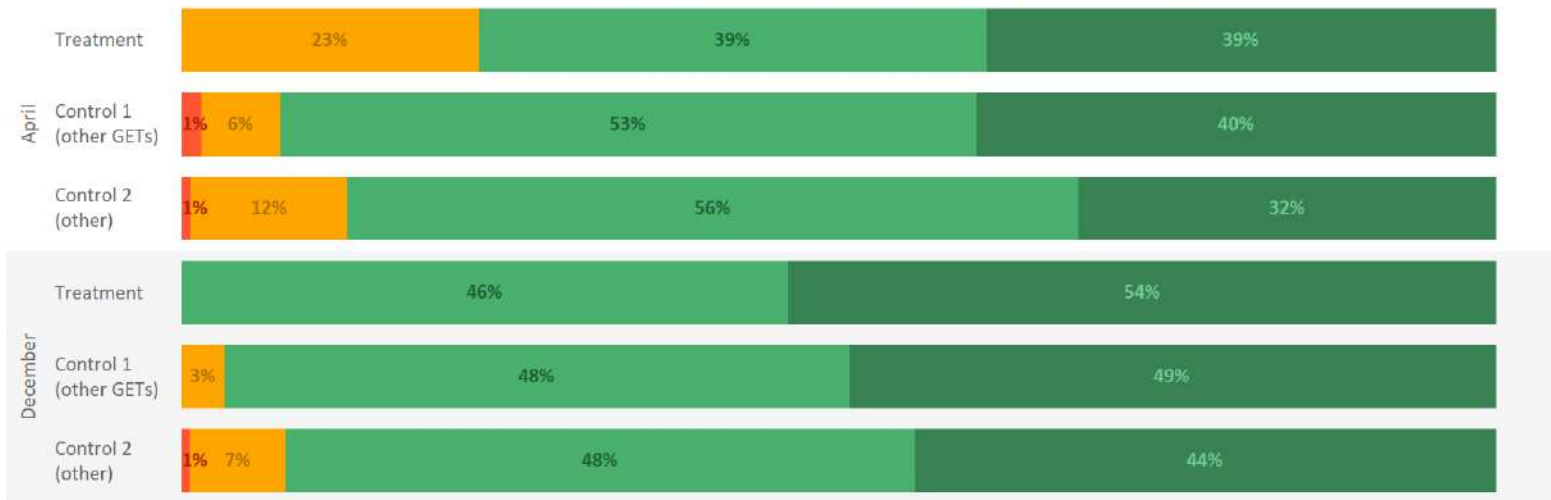
Initial difference (April): The treatment group had 77,4% positive responses, while the control group reached 91,1%, with a difference of -13,7 p.p. (***)

Change: The proportion of positive responses grew from 77,4% to 100,0% (22,6 p.p. ***), while the control group fluctuated from 91,1% to 91,8% (0,7 p.p.). The difference in evolution between the treatment and control group 1 was 21,9 p.p. ***.

03. Pedagogical Framework | Adoption of Teaching Models for Knowledge Construction and Practical Lessons

Distribution of the Percentage of Total Responses per Group and Application for the Item:

(d) I explain how previous lessons relate to the current lesson.



Developed by: Germina. Source: Questionnaire administered to teachers of the Municipal Department of Education of Rio de Janeiro (April to May and December 2024). Filter: Teachers who teach 1st and/or 2nd grade of *Ensino Fundamental*.

- Color key
- Always
 - Frequently
 - Rarely
 - Never or almost never

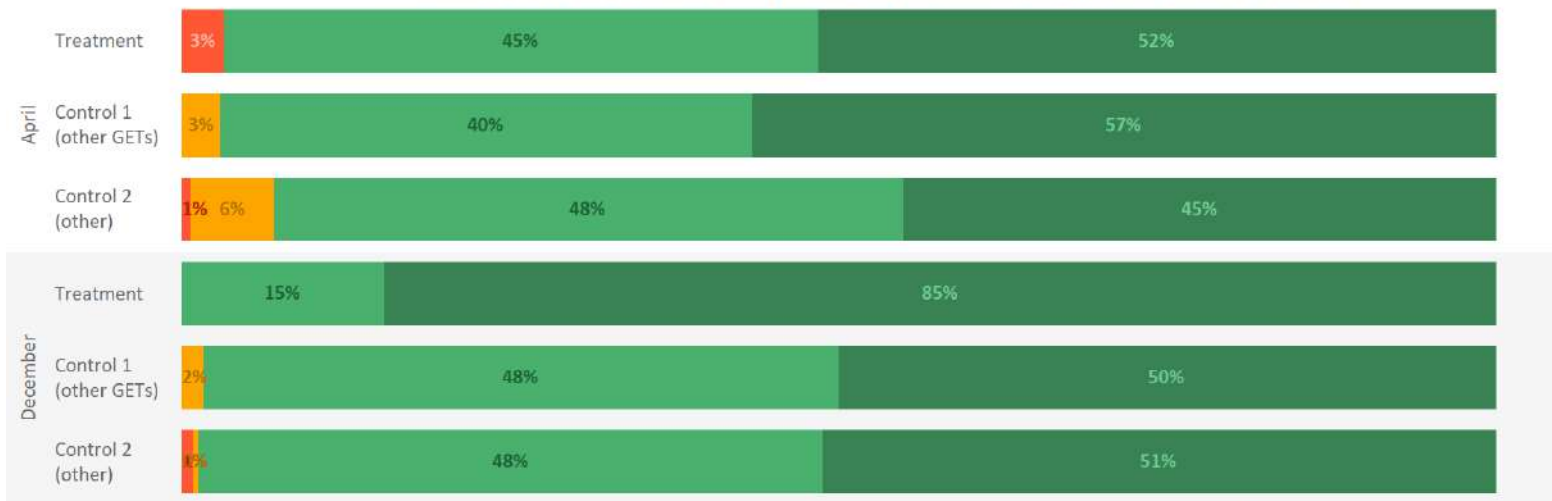
Initial difference (April): The treatment group had 77,4% positive responses, while the control group reached 92,5%, with a difference of -15,1 p.p. (***)

Change: The proportion of positive responses grew from 77,4% to 100,0% (22,6 p.p. ***), while the control group grew from 92,5% to 96,7% (4,2 p.p. ***). The difference in evolution between the treatment and control group 1 was 18,4 p.p. ***.

04. Pedagogical Framework | Adoption of Teaching Models for Knowledge Construction and Practical Lessons

Distribution of the Percentage of Total Responses per Group and Application for the Item:

(m) I refer to a real-life or work-related problem to demonstrate why the new knowledge is useful.



Developed by: Germina. Source: Questionnaire administered to teachers of the Municipal Department of Education of Rio de Janeiro (April to May and December 2024). Filter: Teachers who teach 1st and/or 2nd grade of *Ensino Fundamental*.

Color key

- Always
- Frequently
- Rarely
- Never or almost never

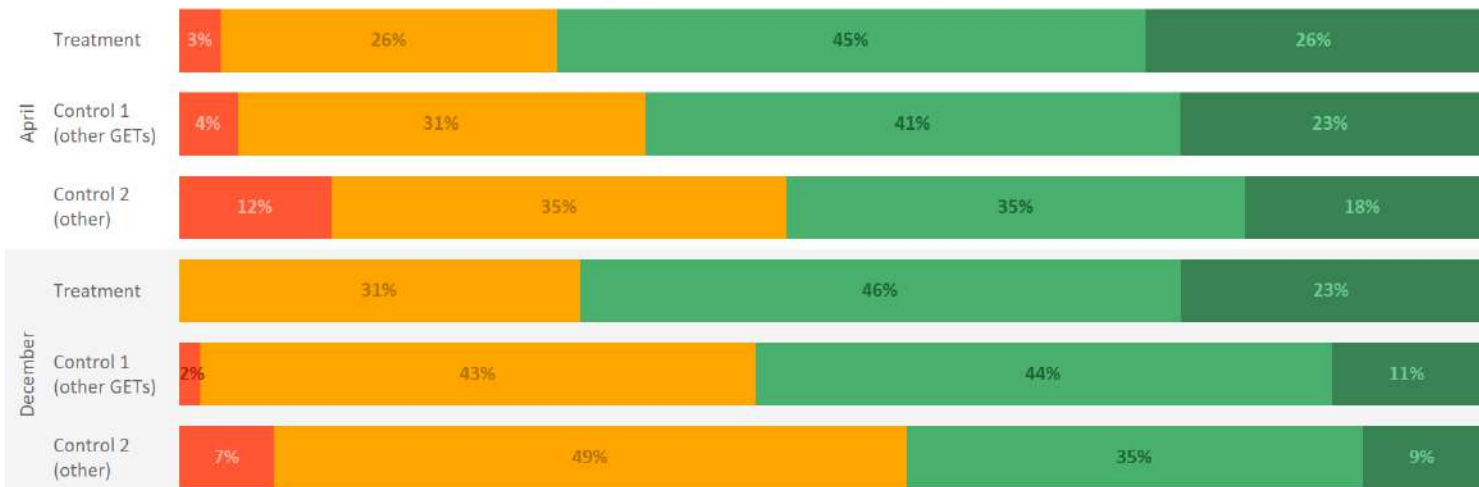
Initial difference (April): The treatment group had 96,8% positive responses, while the control group reached 97,1%, with a difference of -0,3 p.p.

Change: The proportion of positive responses fluctuated from 96,8 to 100,0% (3,2 p.p.), while the control group fluctuated from 97,1% to 98,3% (1,3 p.p.). The difference in evolution between the treatment and control group 1 was 2,0 p.p.

05. Pedagogical Framework | Adoption of Teaching Models for Knowledge Construction and Practical Lessons

Distribution of the Percentage of Total Responses per Group and Application for the Item:

(s) I take students outside the classroom for activities.



Developed by: Germmin. Source: Questionnaire administered to teachers of the Municipal Department of Education of Rio de Janeiro (April to May and December 2024). Filter: Teachers who teach 1st and/or 2nd grade of *Ensino Fundamental*.

Color key

- Always
- Frequently
- Rarely
- Never or almost never

Initial difference (April): The treatment group had 71,0% positive responses, while the control group reached 64,2%, with a difference of 6,8 p.p. (***)

Change: The proportion of positive responses fluctuated from 71,0% to 69,2% (-1,7 p.p.), while the control group decreased from 64,2% to 55,7% (-8,4 p.p. ***). The difference in evolution between the treatment and control group 1 was 6,7 p.p.

06. Pedagogical Framework | Use of Robust Teaching Materials

Distribution of the Percentage of Total Responses per Group and Application for the Question Item: *Considering your classes throughout this year, have you used the following resources?*

(a) Textbook provided by the school.



Developed by: Germina. Source: Questionnaire administered to teachers of the Municipal Department of Education of Rio de Janeiro (April to May and December 2024). Filter: Teachers who teach 1st and/or 2nd grade of *Ensino Fundamental*.

Color key

- Yes
- No, by preference
- No, due to unavailability

Initial difference (April): The treatment group had 87,1% positive responses, while the control group reached 87,7%, with a difference of -0,6 p.p. ().

Change: The proportion of positive responses grew from 87,1% to 100,0% (12,9 p.p. **), while the control group grew from 87,7% to 91,8% (4,1 p.p. ***). The difference in evolution between the treatment and control group 1 was 8,8 p.p.

07. Pedagogical Framework | Use of Robust Teaching Materials

Distribution of the Percentage of Total Responses per Group and Application for the Question Item: *Considering your classes throughout this year, have you used the following resources?*

(b) Other materials provided by the school.



Developed by: Germina. Source: Questionnaire administered to teachers of the Municipal Department of Education of Rio de Janeiro (April to May and December 2024). Filter: Teachers who teach 1st and/or 2nd grade of *Ensino Fundamental*.

Color key

- Yes
- No, by preference
- No, due to unavailability

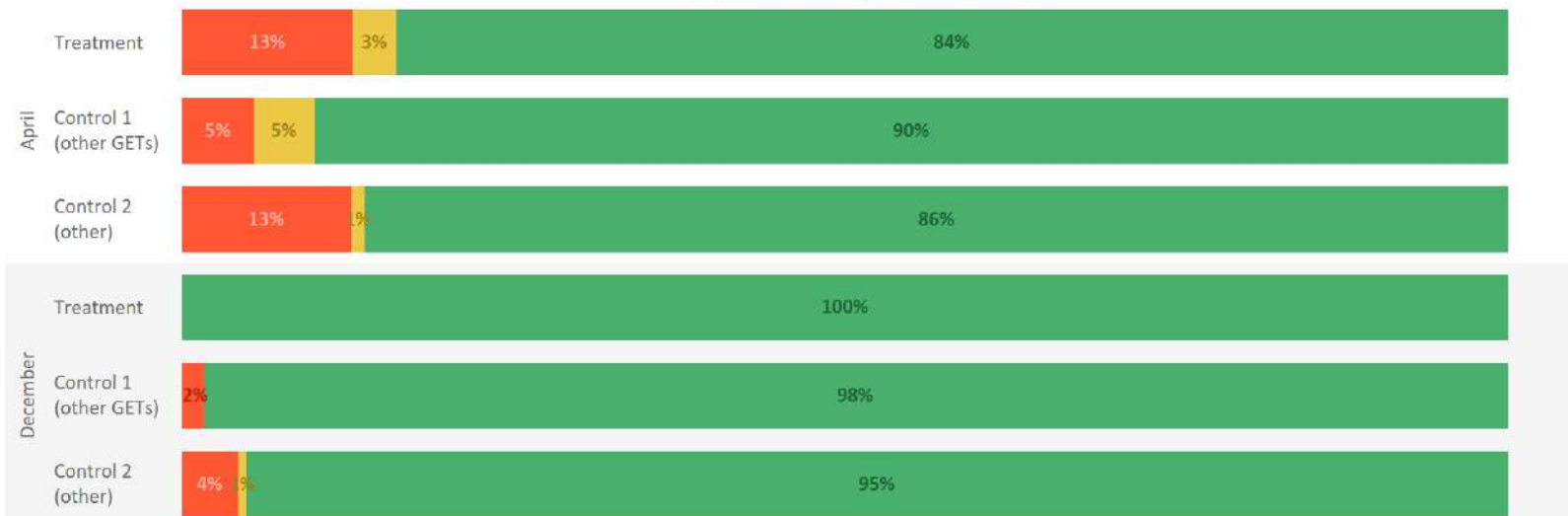
Initial difference (April): The treatment group had 87,1% positive responses, while the control group reached 93,1%, with a difference of -6,0 p.p. (***)

Change: The proportion of positive responses fluctuated from 87,1% to 84,6% (-2,5 p.p.), while the control group grew from 93,1% to 100,0% (6,9 p.p. ***). The difference in evolution between the treatment and control group 1 was -9,4 p.p.

08. Pedagogical Framework | Use of Robust Teaching Materials

Distribution of the Percentage of Total Responses per Group and Application for the Question Item: *Considering your classes throughout this year, have you used the following resources?*

(d) Physical or digital manipulatives.



Developed by: Germina. Source: Questionnaire administered to teachers of the Municipal Department of Education of Rio de Janeiro (April to May and December 2024). Filter: Teachers who teach 1st and/or 2nd grade of *Ensino Fundamental*.

Color key

- Yes
- No, by preference
- No, due to unavailability

Initial difference (April): The treatment group had 83,9% positive responses, while the control group reached 90,0%, with a difference of -6,1 p.p. (***)

Change: The proportion of positive responses grew from 83,9% to 100,0% (16,1 p.p. **), while the control group grew from 90,0% to 98,4% (8,4 p.p. ***). The difference in evolution between the treatment and control group 1 was 7,8 p.p.

09. Pedagogical Framework | Use of Robust Teaching Materials

Distribution of the Percentage of Total Responses per Group and Application for the Question Item: *Considering your classes throughout this year, have you used the following resources?*

(c) Materials created by me.



Developed by: Germina. Source: Questionnaire administered to teachers of the Municipal Department of Education of Rio de Janeiro (April to May and December 2024). Filter: Teachers who teach 1st and/or 2nd grade of *Ensino Fundamental*.

Color key

- Yes
- No, by preference
- No, due to unavailability

Initial difference (April): The treatment group had 90,3% positive responses, while the control group reached 94,6%, with a difference of -4,3 p.p. (**).

Change: The proportion of positive responses fluctuated from 90,3% to 100,0% (9,7 p.p.), while the control group grew from 94,6% to 98,4% (3,7 p.p. **). The difference in evolution between the treatment and control group 1 was 5,9 p.p.



Continuous Professional Development

2. Survey

Continuous Professional Development

Impact Analysis | 2. Survey for Teachers and Lead Educators

Intermediate Results

Question: At this school, how often do you have discussions with colleagues about:



A. Expansion of Teachers' Repertoire of Pedagogical Approaches

Integration between curriculum components (e.g., interdisciplinary projects).
-3,8 p.p

Teaching and learning methodologies.
+18,8 p.p. ***

Feedback and analysis of the Network Diagnostic Assessment (ADR) results.
+6,8 p.p.

Development of specific students.
+15,6 p.p ***



B. Enhancement of Mathematics Teaching Skills

Deepening your knowledge of the curriculum components you teach.
-6 p.p.

Improving teaching methodologies.
+2 p.p.

Using new technologies to support your activities.
-5,4 p.p

Understanding the learning process.
-3,0 p.p

Question: Indicate the level of contribution of the training activities and courses you attended in the past 12 months to:

I believe my knowledge of mathematics is sufficient for the grade level I teach.
-12,9 p.p **

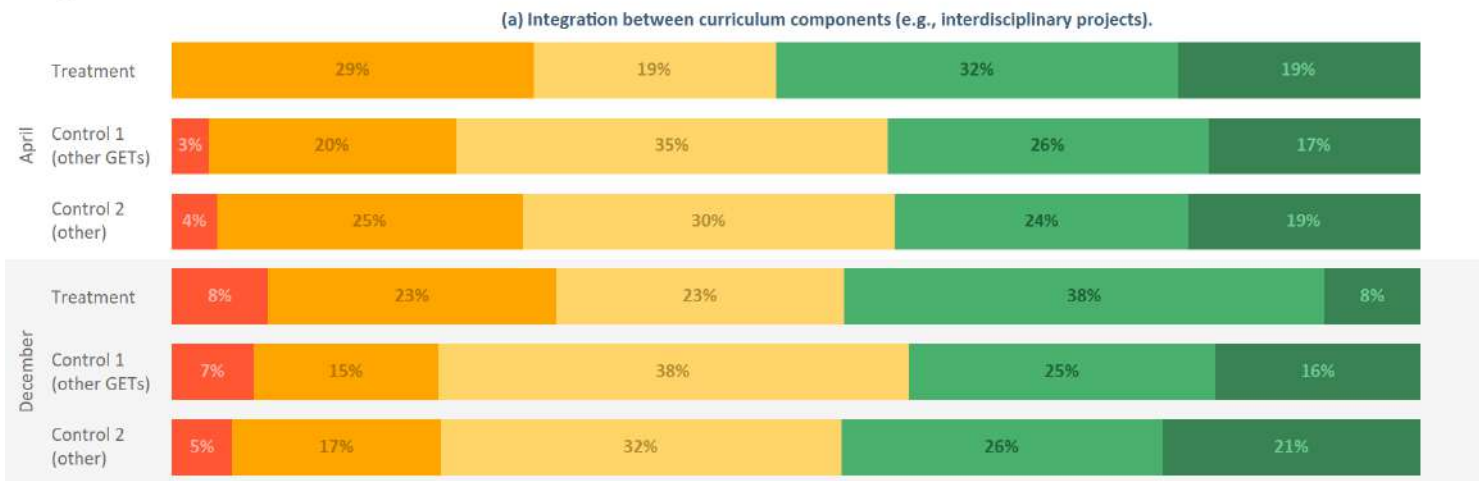
Question: Indicate how much you agree with the following statements:



Values presented as '+X p.p.' represent the difference in variations between groups, where 'X' is the difference in percentage points. The symbols (*, **, ***) indicate the level of statistical confidence: * for 90%, ** for 95%, and *** for 99%. The absence of a symbol means the difference is not significant.

10. Continuous Professional Development | Expansion of Pedagogical Approach Repertoire

Distribution of the Percentage of Total Responses per Group and Application for the Question Item: *At this school, how often do you have discussions with colleagues about:*



Developed by: Germina. Source: Questionnaire administered to teachers of the Municipal Department of Education of Rio de Janeiro (April to May and December 2024). Filter: Teachers who teach 1st and/or 2nd grade of *Ensino Fundamental*.

Color key

- Daily or almost daily
- Once or twice a week
- Once or twice a month
- Once or twice a year
- Never

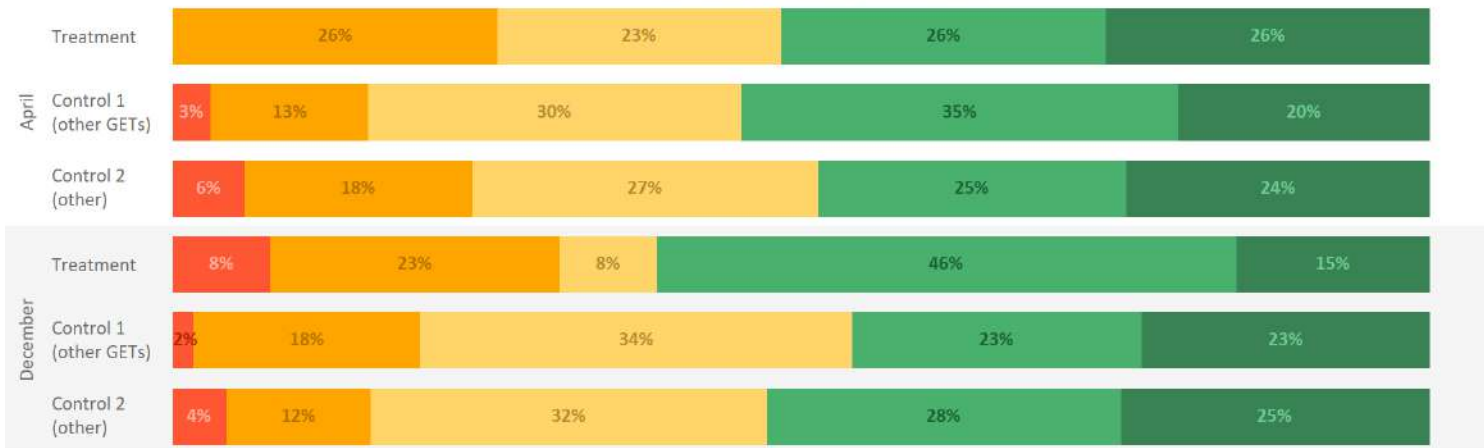
Initial difference (April): The treatment group had 51,6% positive responses, while the control group reached 42,7%, with a difference of 9,0 p.p. (***)

Change: The proportion of positive responses fluctuated from 51,6% to 46,2% (-5,5 p.p.), while the control group decreased from 42,7% to 41,0% (-1,7 p.p. *). The difference in evolution between the treatment and control group 1 was -3,8 p.p.

11. Continuous Professional Development | Expansion of Pedagogical Approach Repertoire

Distribution of the Percentage of Total Responses per Group and Application for the Question Item: *At this school, how often do you have discussions with colleagues about:*

(b) Teaching and learning methodologies.



Developed by: Germina. Source: Questionnaire administered to teachers of the Municipal Department of Education of Rio de Janeiro (April to May and December 2024). Filter: Teachers who teach 1st and/or 2nd grade of *Ensino Fundamental*.

Color key

- Daily or almost daily
- Once or twice a week
- Once or twice a month
- Once or twice a year
- Never

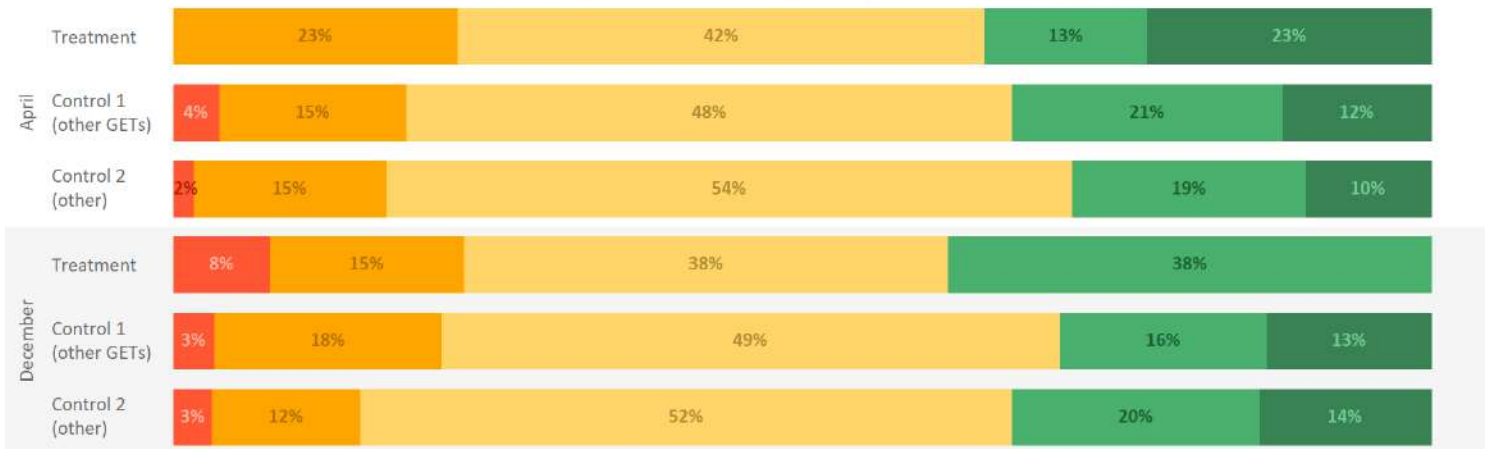
Initial difference (April): The treatment group had 51,6% positive responses, while the control group reached 54,8%, with a difference of -3,2 p.p. (**).

Change: The proportion of positive responses grew from 51,6% to 61,5% (9,9 p.p. *), while the control group decreased from 54,8% to 45,9% (-8,9 p.p. ***). The difference in evolution between the treatment and control group 1 was 18,8 p.p. ***.

12. Continuous Professional Development | Expansion of Pedagogical Approach Repertoire

Distribution of the Percentage of Total Responses per Group and Application for the Question Item: *At this school, how often do you have discussions with colleagues about:*

(c) Feedback and analysis of the Network Diagnostic Assessment (ADR) results.



Developed by: Germina. Source: Questionnaire administered to teachers of the Municipal Department of Education of Rio de Janeiro (April to May and December 2024). Filter: Teachers who teach 1st and/or 2nd grade of *Ensino Fundamental*.

Color key

- Daily or almost daily
- Once or twice a week
- Once or twice a month
- Once or twice a year
- Never

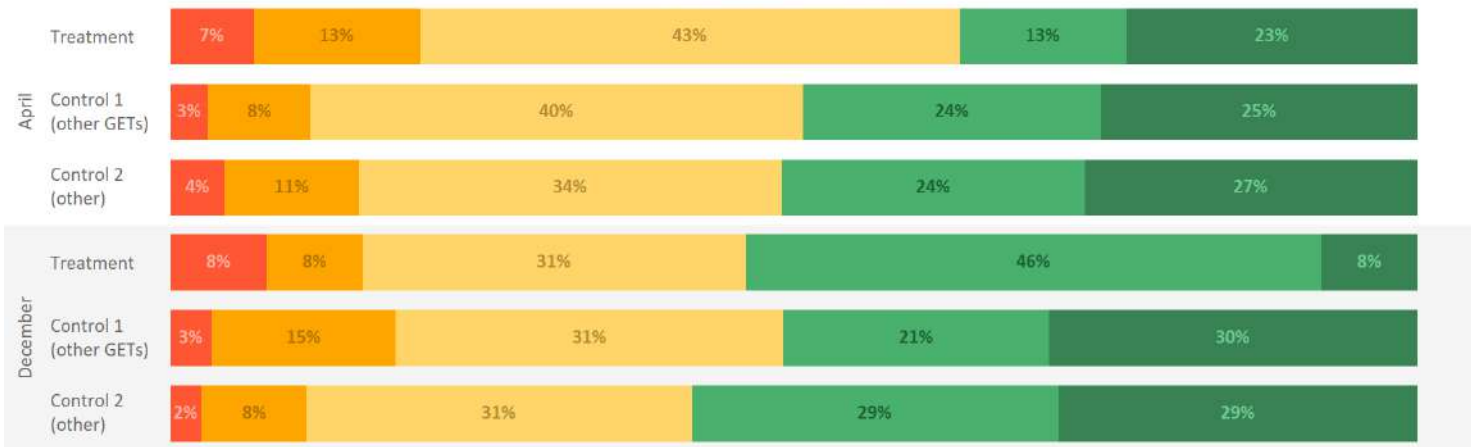
Initial difference (April): The treatment group had 35,5% positive responses, while the control group reached 33,3%, with a difference of 2,2 p.p. (*).

Change: The proportion of positive responses fluctuated from 35,5% to 38,5% (3,0 p.p.), while the control group decreased from 33,3% to 29,5% (-3,8 p.p. ***). The difference in evolution between the treatment and control group 1 was 6,8 p.p.

13. Continuous Professional Development | Expansion of Pedagogical Approach Repertoire

Distribution of the Percentage of Total Responses per Group and Application for the Question Item: *At this school, how often do you have discussions with colleagues about:*

(d) Development of specific students.



Developed by: Germina. Source: Questionnaire administered to teachers of the Municipal Department of Education of Rio de Janeiro (April to May and December 2024). Filter: Teachers who teach 1st and/or 2nd grade of *Ensino Fundamental*.

Color key

- Daily or almost daily
- Once or twice a week
- Once or twice a month
- Once or twice a year
- Never

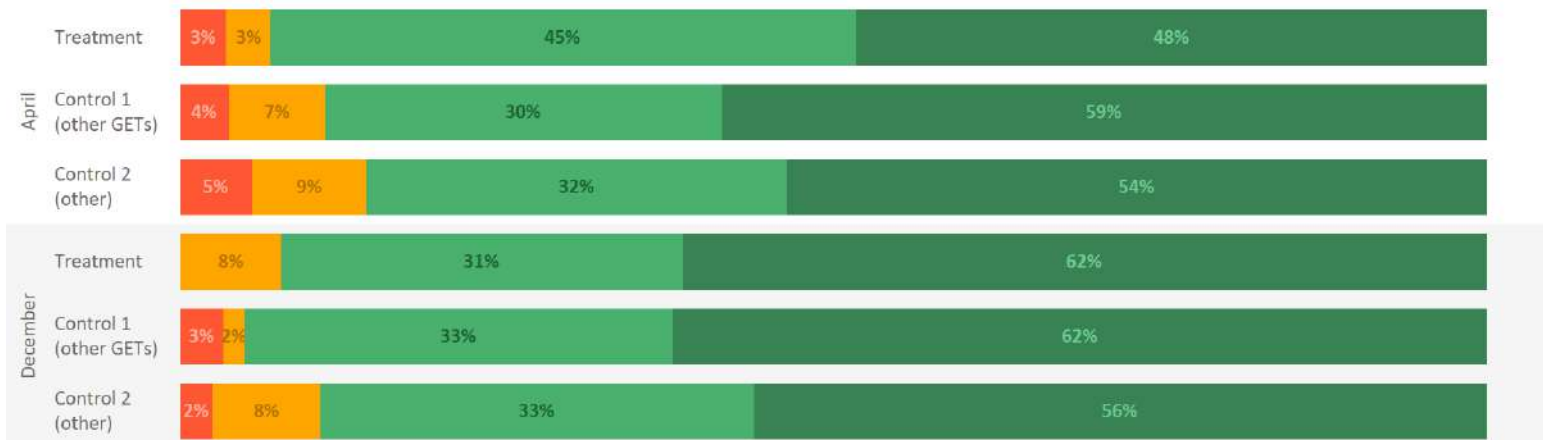
Initial difference (April): The treatment group had 36,7% positive responses, while the control group reached 49,3%, with a difference of -12,6 p.p. (***)

Change: The proportion of positive responses grew from 36,7% to 53,9% (17,2 p.p. ***), while the control group fluctuated from 49,3% to 50,8% (1,6 p.p.). The difference in evolution between the treatment and control group 1 was 15,6 p.p. ***.

14. Continuous Professional Development | Enhancement of Teaching Skills in Mathematics

Distribution of the Percentage of Total Responses per Group and Application for the Question Item: *Indicate the level of contribution of training activities and courses taken in the last 12 months to:*

(a) Deepening your knowledge of the curriculum components you teach.



Developed by: Gemina. Source: Questionnaire administered to teachers of the Municipal Department of Education of Rio de Janeiro (April to May and December 2024). Filter: Teachers who teach 1st and/or 2nd grade of *Ensino Fundamental*.

Color key

- Contributes a lot
- Contributes moderately
- Contributes little2
- Does not contribute

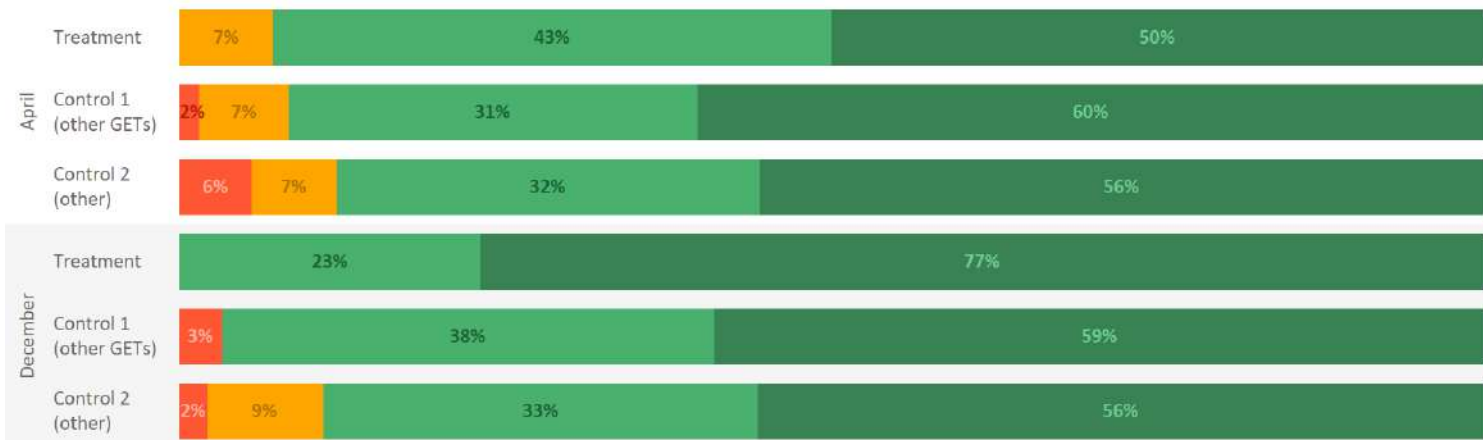
Initial difference (April): The treatment group had 93,0% positive responses, while the control group reached 89,0%, with a difference of 4,0 p.p. (**).

Change: The proportion of positive responses fluctuated from 93,0% to 93,0% (0,0 p.p.), while the control group grew from 89,0% to 95,0% (6,0 p.p. ***). The difference in evolution between the treatment and control group 1 was -6,0 p.p.

15. Continuous Professional Development | Enhancement of Teaching Skills in Mathematics

Distribution of the Percentage of Total Responses per Group and Application for the Question Item: *Indicate the level of contribution of training activities and courses taken in the last 12 months to:*

(f) Improving teaching methodologies.



Developed by: Germina. Source: Questionnaire administered to teachers of the Municipal Department of Education of Rio de Janeiro (April to May and December 2024). Filter: Teachers who teach 1st and/or 2nd grade of *Ensino Fundamental*.

Color key

- Contributes a lot
- Contributes moderately
- Contributes little2
- Does not contribute

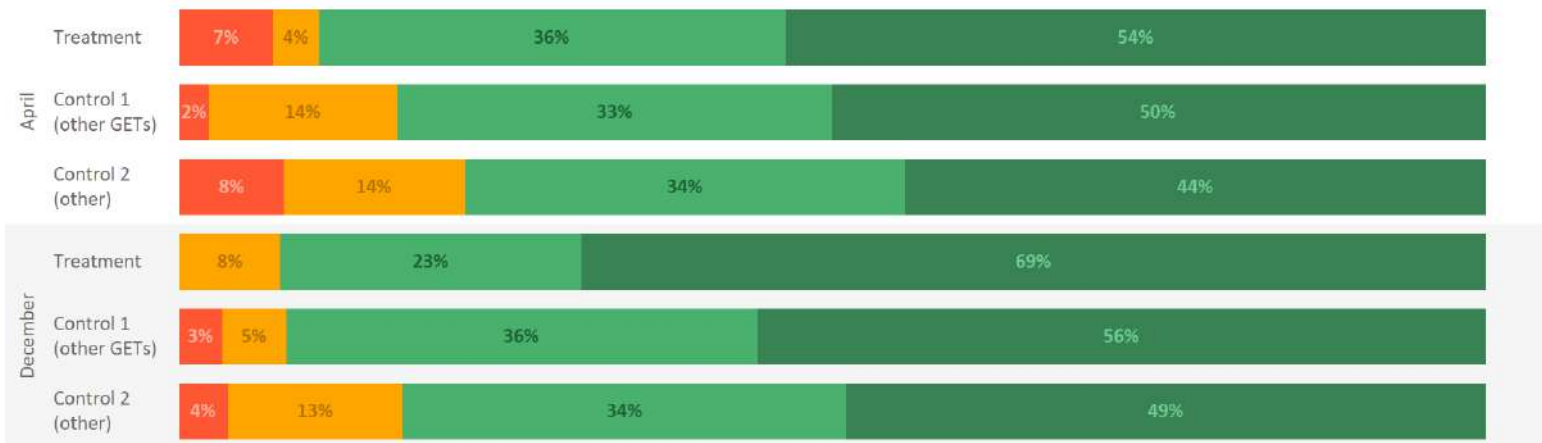
Initial difference (April): The treatment group had 92,9% positive responses, while the control group reached 91,6%, with a difference of 1,3 p.p. ().

Change: The proportion of positive responses fluctuated from 92,9% to 100,0% (7,1 p.p.), while the control group grew from 91,6% to 96,7% (5,1 p.p. ***). The difference in evolution between the treatment and control group 1 was 2,0 p.p.

16. Continuous Professional Development | Enhancement of Teaching Skills in Mathematics

Distribution of the Percentage of Total Responses per Group and Application for the Question Item: *Indicate the level of contribution of training activities and courses taken in the last 12 months to:*

(d) Using new technologies to support your activities.



Developed by: Germina. Source: Questionnaire administered to teachers of the Municipal Department of Education of Rio de Janeiro (April to May and December 2024). Filter: Teachers who teach 1st and/or 2nd grade of *Ensino Fundamental*.

Color key

- Contributes a lot
- Contributes moderately
- Contributes little
- Does not contribute

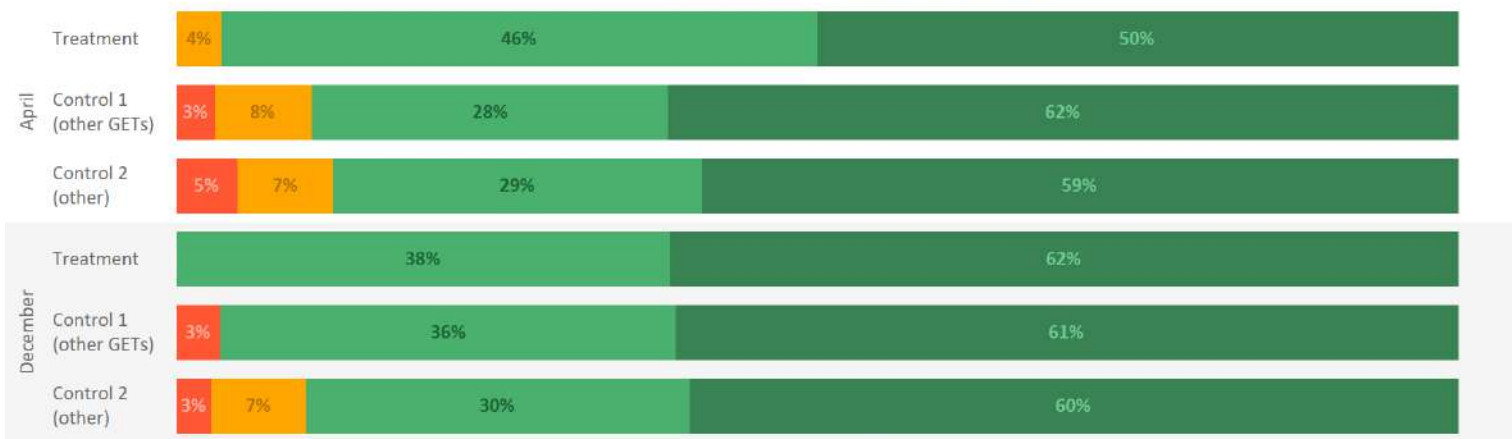
Initial difference (April): The treatment group had 89,3% positive responses, while the control group reached 83,3%, with a difference of 6,0 p.p. (***)

Change: The proportion of positive responses fluctuated from 89,3% to 92,3% (3,0 p.p.), while the control group grew from 83,3% to 91,8% (8,5 p.p. ***). The difference in evolution between the treatment and control group 1 was -5,4 p.p.

17. Continuous Professional Development | Enhancement of Teaching Skills in Mathematics

Distribution of the Percentage of Total Responses per Group and Application for the Question Item: *Indicate the level of contribution of training activities and courses taken in the last 12 months to:*

(b) Understanding the learning process.



Developed by: Germina. Source: Questionnaire administered to teachers of the Municipal Department of Education of Rio de Janeiro (April to May and December 2024). Filter: Teachers who teach 1st and/or 2nd grade of *Ensino Fundamental*.

Color key

- Contributes a lot
- Contributes moderately
- Contributes little2
- Does not contribute

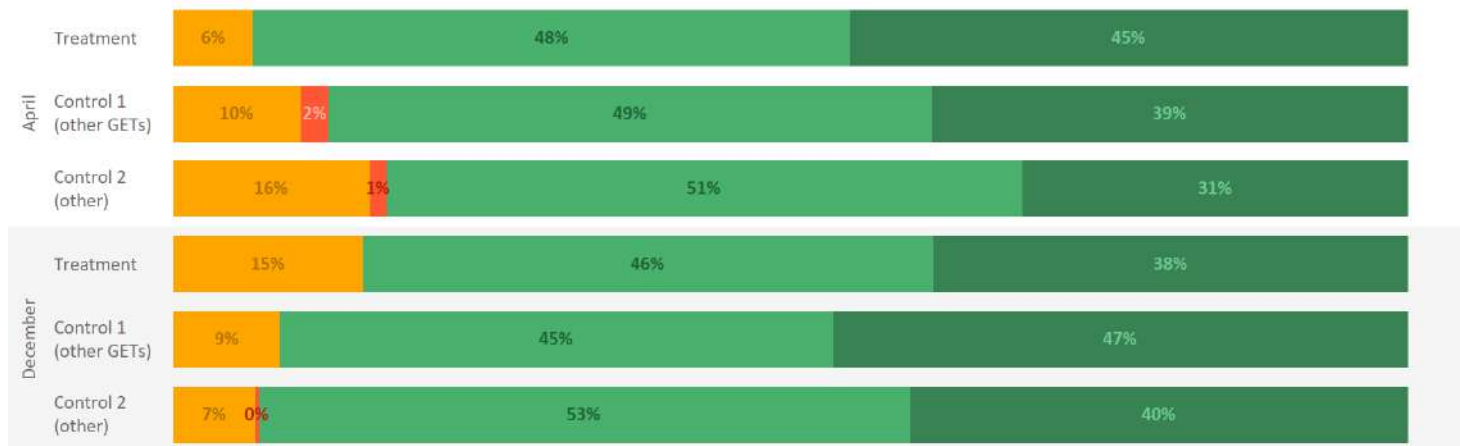
Initial difference (April): The treatment group had 96,0% positive responses, while the control group reached 90,0%, with a difference of 6,0 p.p. (***)

Change: The proportion of positive responses fluctuated from 96,0% to 100,0% (4,0 p.p.), while the control group grew from 90,0% to 97,0% (7,0 p.p. ***). The difference in evolution between the treatment and control group 1 was -3,0 p.p.

18. Continuous Professional Development | Enhancement of Teaching Skills in Mathematics

Distribution of the Percentage of Total Responses per Group and Application for the Item:

(a) I believe my knowledge of mathematics is sufficient for the grade level I teach.



Developed by: Germina. Source: Questionnaire administered to teachers of the Municipal Department of Education of Rio de Janeiro (April to May and December 2024). Filter: Teachers who teach 1st and/or 2nd grade of *Ensino Fundamental*.

Color key

- Strongly agree
- Agree
- Disagree
- Strongly disagree

Initial difference (April): The treatment group had 93,6% positive responses, while the control group reached 87,4%, with a difference of 6,1 p.p. (***)

Change: The proportion of positive responses fluctuated from 93,6% to 84,6% (-8,9 p.p.), while the control group grew from 87,4% to 91,4% (4,0 p.p. ***). The difference in evolution between the treatment and control group 1 was -12,9 p.p. **.



Teaching Materials

2. Survey

Teaching Materials

Impact Analysis | 2. Survey for Teachers and Lead Educators

Intermediate
Results



Use of More Engaging
Teaching and Learning
Methodologies

I assign tasks/exercises
for which there is no
obvious solution.
-12,9 p.p. ***

I assign tasks/exercises that
require critical thinking from
students.
+7,5 p.p

I divide the class into
small groups to work
together on solving a
problem or completing a
task.
+14,8 p.p. ***

I have students
complete similar tasks
until I see that all of
them have understood
the lesson content.
+4,1 p.p

Question: Regarding teaching this specific class, how often do you do the following?

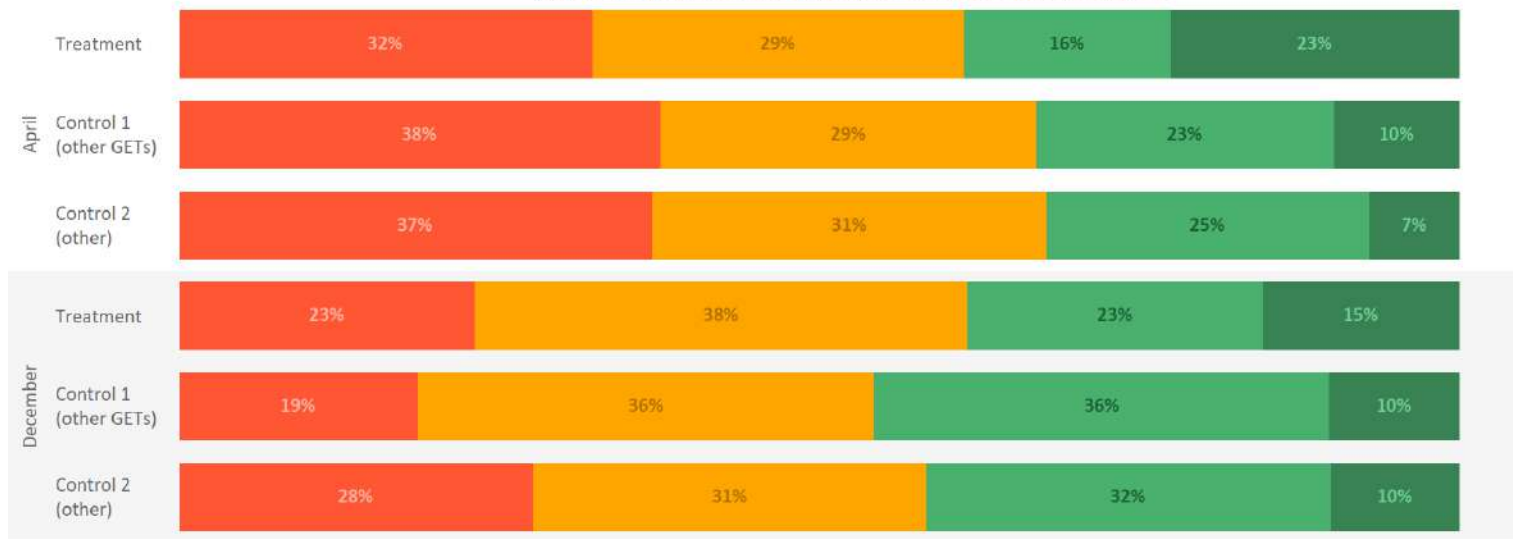


Values presented as '+X p.p.' represent the difference in variations between groups, where 'X' is the difference in percentage points. The symbols (*, **, ***) indicate the level of statistical confidence: * for 90%, ** for 95%, and *** for 99%. The absence of a symbol means the difference is not significant.

19. Teaching Materials | Use of More Engaging Teaching-Learning Methodologies

Distribution of the Percentage of Total Responses per Group and Application for the Question Item:

(e) I assign tasks/exercises for which there is no obvious solution.



Developed by: Gemina. Source: Questionnaire administered to teachers of the Municipal Department of Education of Rio de Janeiro (April to May and December 2024). Filter: Teachers who teach 1st and/or 2nd grade of *Ensino Fundamental*.

Color key

- Always
- Frequently
- Rarely
- Never or almost never

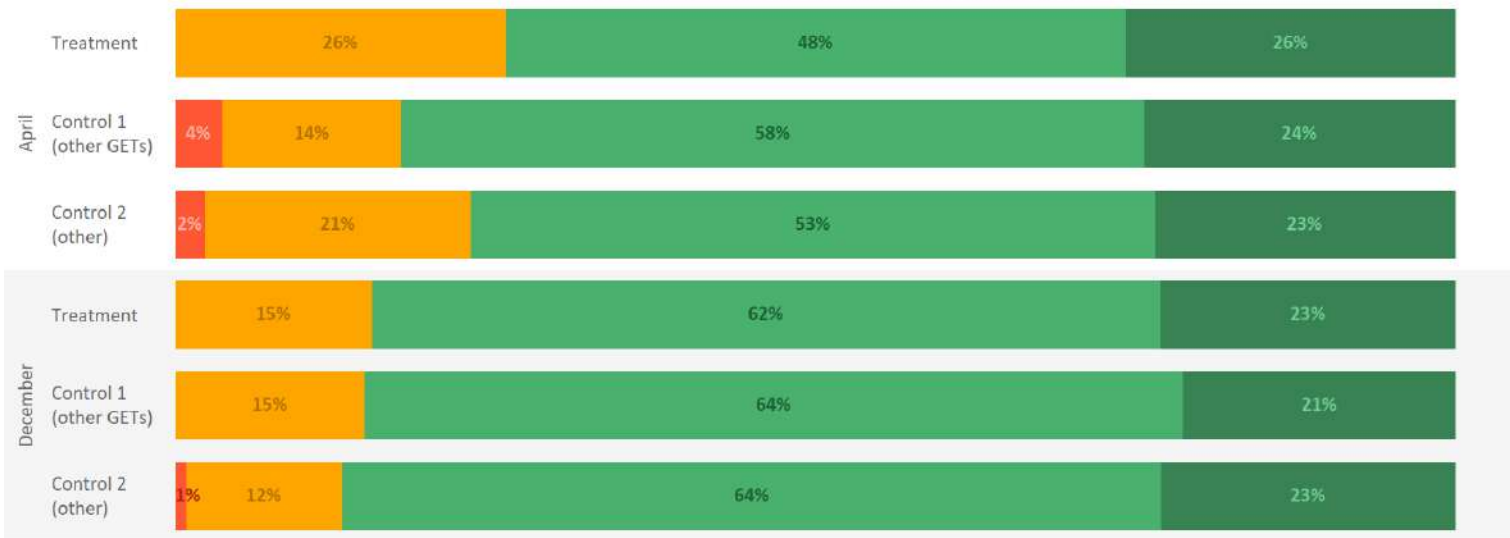
Initial difference (April): The treatment group had 38,7% positive responses, while the control group reached 33,1%, with a difference of 5,6 p.p. (***)

Change: The proportion of positive responses fluctuated from 38,7% to 38,5% (-0,3 p.p.), while the control group grew from 33,1% to 45,8% (12,7 p.p. ***). The difference in evolution between the treatment and control group 1 was -12,9 p.p. ***.

20. Teaching Materials | Use of More Engaging Teaching-Learning Methodologies

Distribution of the Percentage of Total Responses per Group and Application for the Question Item:

(f) I assign tasks/exercises that require critical thinking from students.



Developed by: Germina. Source: Questionnaire administered to teachers of the Municipal Department of Education of Rio de Janeiro (April to May and December 2024). Filter: Teachers who teach 1st and/or 2nd grade of *Ensino Fundamental*.

Color key

- Always
- Frequently
- Rarely
- Never or almost never

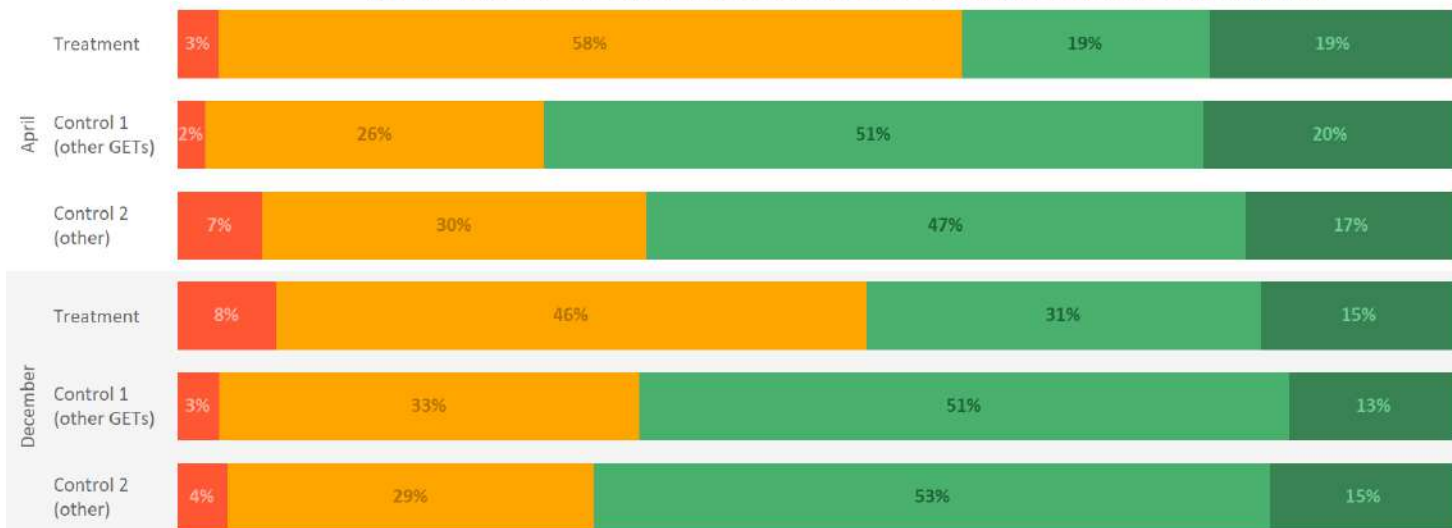
Initial difference (April): The treatment group had 74,2% positive responses, while the control group reached 82,4%, with a difference of -8,2 p.p. (***)

Change: The proportion of positive responses grew from 74,2% to 84,6% (10,4 p.p. *), while the control group grew from 82,4% to 85,3% (2,9 p.p. **). The difference in evolution between the treatment and control group 1 was 7,5 p.p.

21. Teaching Materials | Use of More Engaging Teaching-Learning Methodologies

Distribution of the Percentage of Total Responses per Group and Application for the Question Item:

(g) I divide the class into small groups to work together on solving a problem or completing a task.



Developed by: Germins. Source: Questionnaire administered to teachers of the Municipal Department of Education of Rio de Janeiro (April to May and December 2024). Filter: Teachers who teach 1st and/or 2nd grade of *Ensino Fundamental*.

Color key

- Always
- Frequently
- Rarely
- Never or almost never

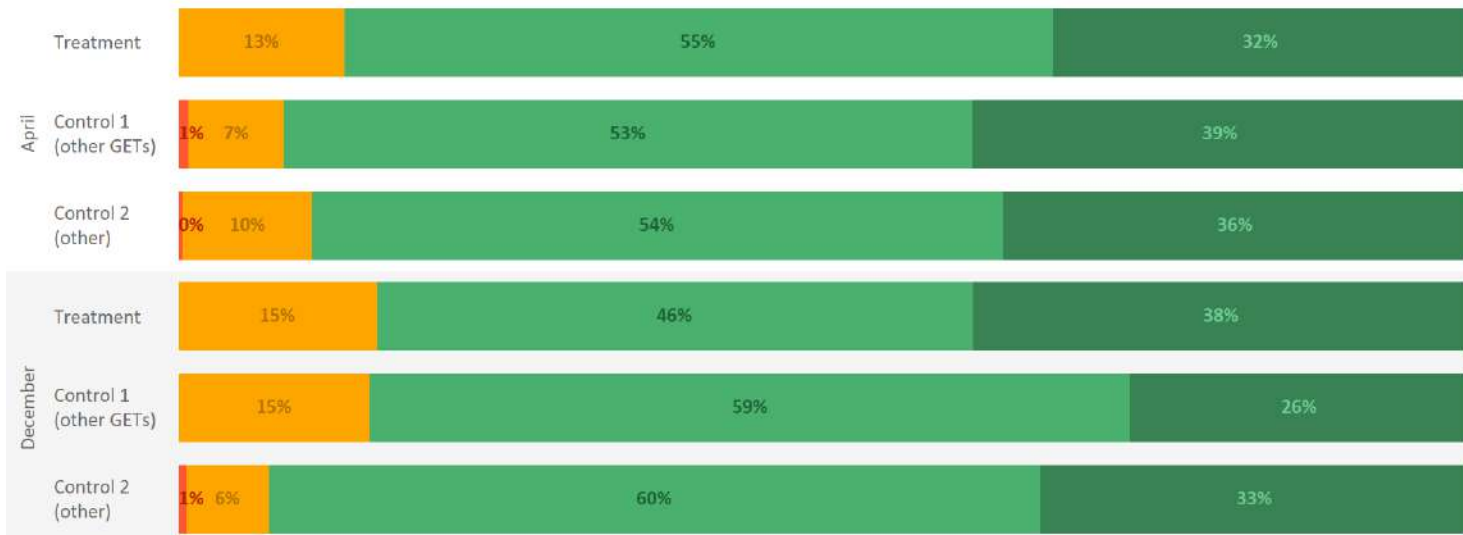
Initial difference (April): The treatment group had 38,7% positive responses, while the control group reached 71,3%, with a difference of -32,6 p.p. (***)

Change: The proportion of positive responses grew from 38,7% to 46,2% (7,4 p.p. *), while the control group decreased from 71,3% to 63,9% (-7,4 p.p. ***). The difference in evolution between the treatment and control group 1 was 14,8 p.p. ***.

22. Teaching Materials | Use of More Engaging Teaching-Learning Methodologies

Distribution of the Percentage of Total Responses per Group and Application for the Question Item:

(n) I have students complete similar tasks until I see that all of them have understood the lesson content.



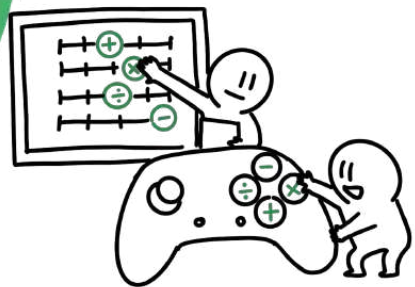
Developed by: Gemina. Source: Questionnaire administered to teachers of the Municipal Department of Education of Rio de Janeiro (April to May and December 2024). Filter: Teachers who teach 1st and/or 2nd grade of *Ensino Fundamental*.

Color key

- Always
- Frequently
- Rarely
- Never or almost never

Initial difference (April): The treatment group had 87,1% positive responses, while the control group reached 91,9%, with a difference of -4,8 p.p. (**).

Change: The proportion of positive responses fluctuated from 87,1% to 84,6% (-2,5 p.p.), while the control group decreased from 91,9% to 85,3% (-6,6 p.p. ***). The difference in evolution between the treatment and control group 1 was 4,1 p.p.



Digital Educational Resources

2. Survey

Digital Educational Resources

Impact Analysis | 2. Survey for Teachers and Lead Educators

Intermediate
Results



A. More Engaged Students Through Gamification

Question: At this school, how often do you have discussions with colleagues about:

Digital educational resources.
+28,4 p.p. ***

Question: Throughout this year, have you used the following resources in your classes?

Digital games.
+13,3 p.p. **

Interactive whiteboards (digital board).
+8,1 p.p *



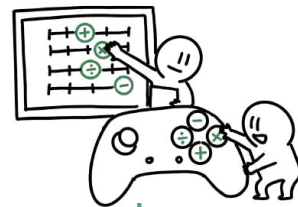
B. Effective Monitoring of Individual Learning Experiences.

Question: Regarding teaching this specific class, how often do you do the following?

I provide feedback to students on their performance.
+2,2 p.p.

I ask students to present their solutions to the assigned activities to their peers.
+8,3 p.p.

I allow students to use ICT (Information and Communication Technology) for projects or classroom tasks.
+10,9 p.p **

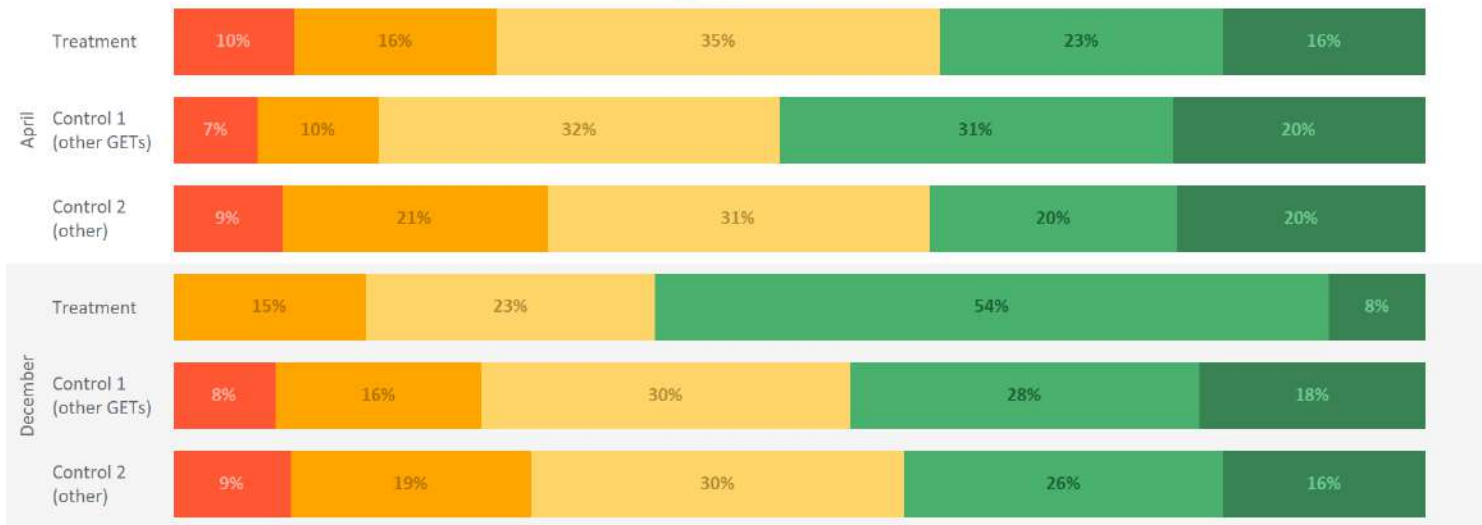


Values presented as '+X p.p.' represent the difference in variations between groups, where 'X' is the difference in percentage points. The symbols (*, **, ***) indicate the level of statistical confidence: * for 90%, ** for 95%, and *** for 99%. The absence of a symbol means the difference is not significant.

23. Digital Educational Resources | Increased Student Engagement Through Gamification

Distribution of the Percentage of Total Responses per Group and Application According to the Frequency of Use of the Item:

(f) Digital educational resources.



Developed by: Gemina. Source: Questionnaire administered to teachers of the Municipal Department of Education of Rio de Janeiro (April to May and December 2024). Filter: Teachers who teach 1st and/or 2nd grade of *Ensino Fundamental*.

Color key

- Daily or almost daily
- Once or twice a week
- Once or twice a month
- Once or twice a year
- Never

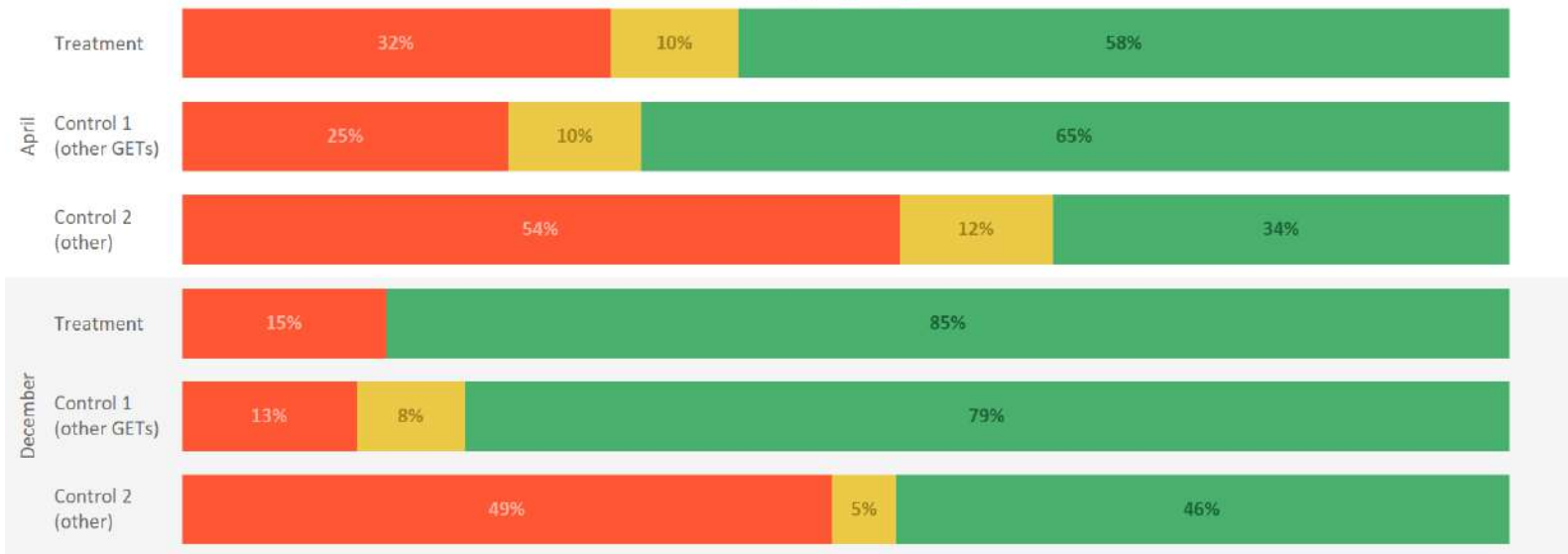
Initial difference (April): The treatment group had 38,7% positive responses, while the control group reached 51,5%, with a difference of -12,8 p.p. (***)

Change: The proportion of positive responses grew from 38,7% to 61,5% (22,8 p.p. ***), while the control group decreased from 51,5% to 45,9% (-5,6 p.p. ***). The difference in evolution between the treatment and control group 1 was 28,4 p.p. ***.

24. Digital Educational Resources | Increased Student Engagement Through Gamification

Distribution of the Percentage of Total Responses per Group and Application According to the Frequency of Use of the Item:

(e) Digital games.



Developed by: Germina. Source: Questionnaire administered to teachers of the Municipal Department of Education of Rio de Janeiro (April to May and December 2024). Filter: Teachers who teach 1st and/or 2nd grade of *Ensino Fundamental*.

Color key
■ Yes
■ No, by preference
■ No, due to unavailability

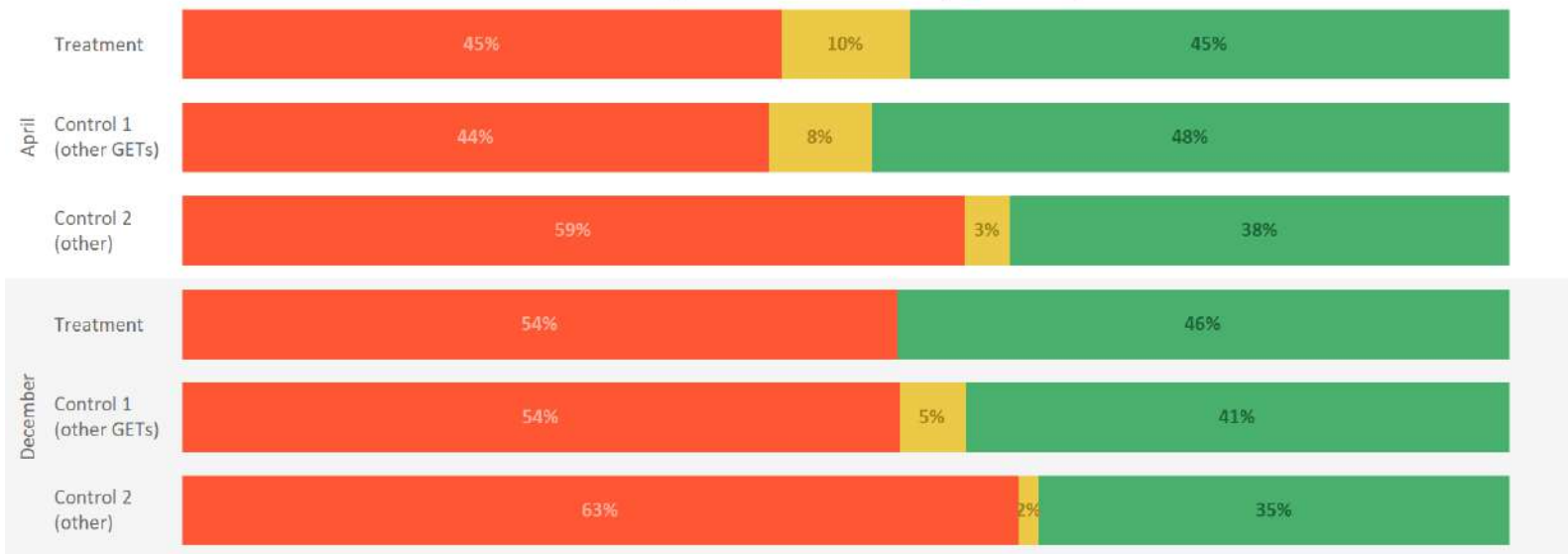
Initial difference (April): The treatment group had 58,1% positive responses, while the control group reached 65,4%, with a difference of -7,3 p.p. (***)

Change: The proportion of positive responses grew from 58,1 to 84,6 (26,6 p.p. ***), while the control group grew from 65,4 to 78,7% (13,3 p.p. ***). The difference in evolution between the treatment and control group 1 was 13,3 p.p. **.

25. Digital Educational Resources | Increased Student Engagement Through Gamification

Distribution of the Percentage of Total Responses per Group and Application According to the Frequency of Use of the Item:

(f) Interactive whiteboards (digital board).



Developed by: Germina. Source: Questionnaire administered to teachers of the Municipal Department of Education of Rio de Janeiro (April to May and December 2024). Filter: Teachers who teach 1st and/or 2nd grade of *Ensino Fundamental*.

Color key
■ Yes
■ No, by preference
■ No, due to unavailability

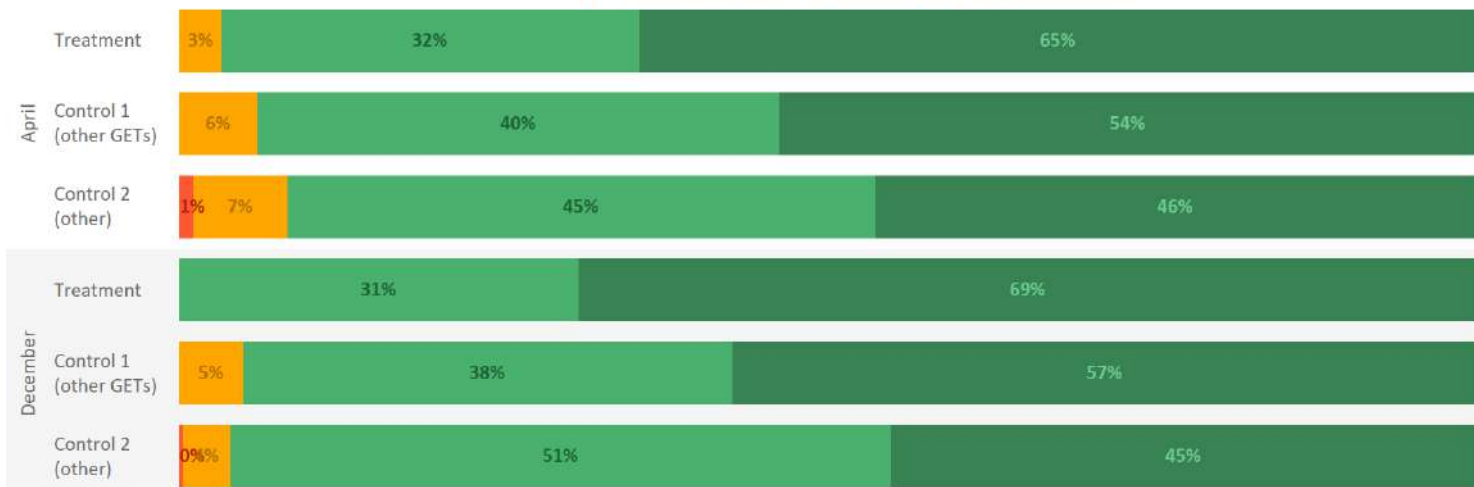
Initial difference (April): The treatment group had 45,2% positive responses, while the control group reached 48,1%, with a difference of -2,9 p.p. (**).

Change: The proportion of positive responses fluctuated from 45,2% to 46,2% (1,0 p.p.), while the control group decreased from 48,1% to 41,0% (-7,1 p.p. ***). The difference in evolution between the treatment and control group 1 was 8,1 p.p. *.

26. Digital Educational Resources | Effective Monitoring of Individual Learning Experiences

Distribution of the Percentage of Total Responses per Group and Application According to the Frequency of Implementation of the Item:

(q) I provide feedback to students on their performance.



Developed by: Germina. Source: Questionnaire administered to teachers of the Municipal Department of Education of Rio de Janeiro (April to May and December 2024). Filter: Teachers who teach 1st and/or 2nd grade of *Ensino Fundamental*.

Color key

- Always
- Frequently
- Rarely
- Never or almost never

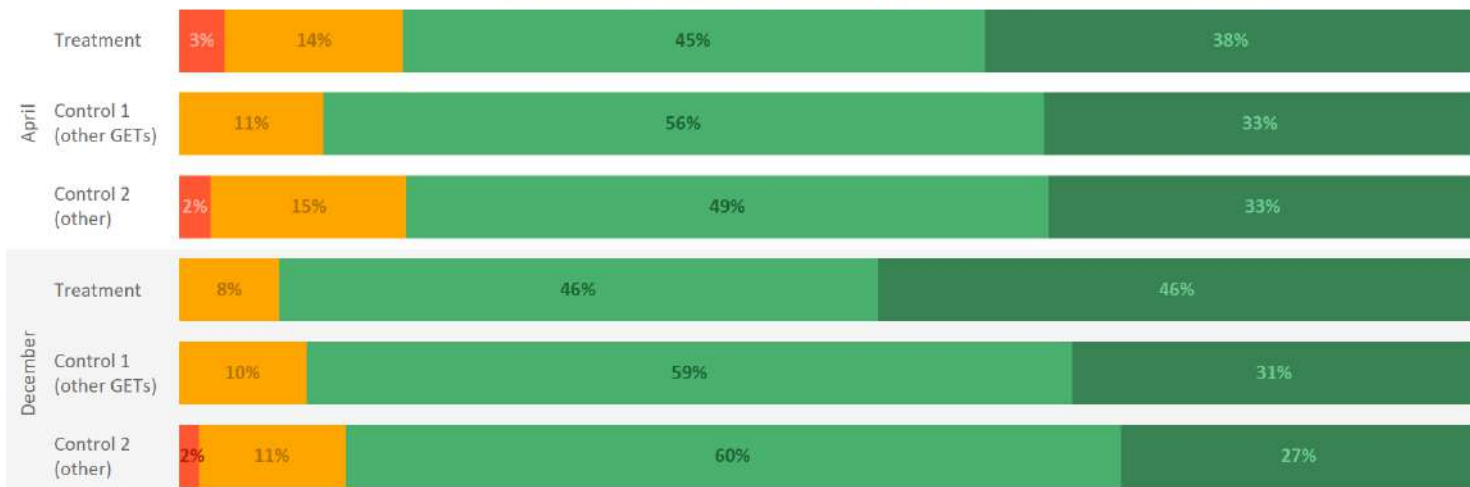
Initial difference (April): The treatment group had 96,8% positive responses, while the control group reached 94,0%, with a difference of 2,7 p.p.

Change: The proportion of positive responses fluctuated from 96,8% to 100,0% (3,2 p.p.), while the control group fluctuated from 94,0% to 95,1% (1,1 p.p.). The difference in evolution between the treatment and control group 1 was 2,2 p.p.

27. Digital Educational Resources | Effective Monitoring of Individual Learning Experiences

Distribution of the Percentage of Total Responses per Group and Application According to the Frequency of Implementation of the Item:

(r) I ask students to present their solutions to the assigned activities to their peers.



Developed by: Germina. Source: Questionnaire administered to teachers of the Municipal Department of Education of Rio de Janeiro (April to May and December 2024). Filter: Teachers who teach 1st and/or 2nd grade of *Ensino Fundamental*.

Color key

- Always
- Frequently
- Rarely
- Never or almost never

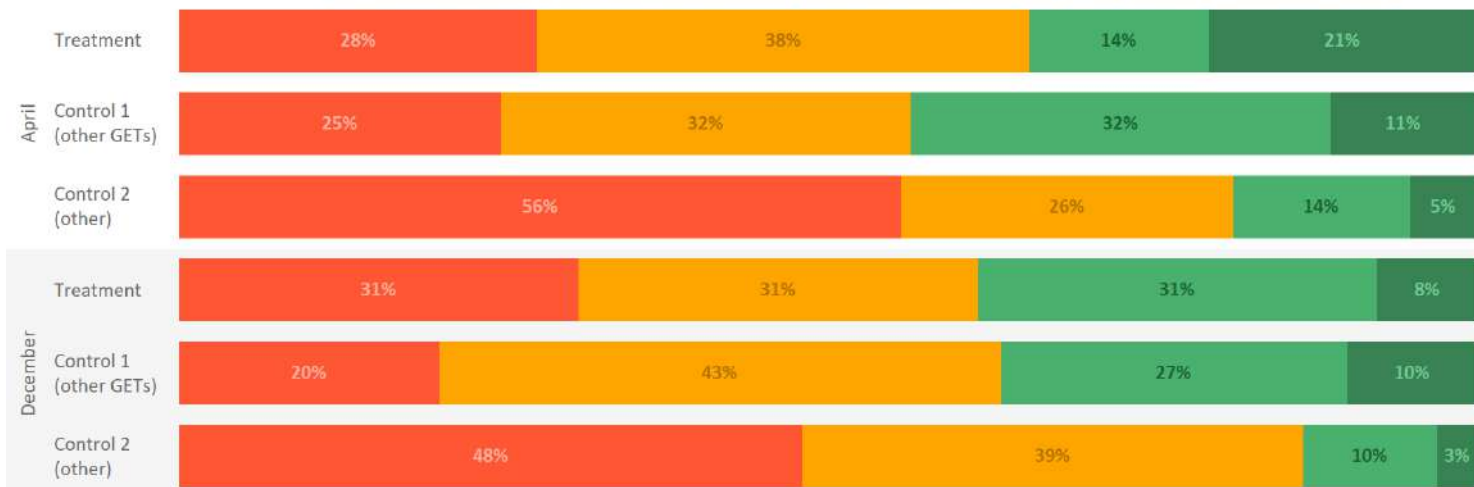
Initial difference (April): The treatment group had 82,8% positive responses, while the control group reached 88,9%, with a difference of -6,1 p.p. (***)

Change: The proportion of positive responses fluctuated from 82,8% to 92,3% (9,6 p.p.), while the control group fluctuated from 88,9% to 90,2% (1,3 p.p.). The difference in evolution between the treatment and control group 1 was 8,3 p.p.

28. Digital Educational Resources | Effective Monitoring of Individual Learning Experiences

Distribution of the Percentage of Total Responses per Group and Application According to the Frequency of Implementation of the Item:

(p) I allow students to use ICT (Information and Communication Technology) for projects or classroom tasks.



Developed by: Germina. Source: Questionnaire administered to teachers of the Municipal Department of Education of Rio de Janeiro (April to May and December 2024). Filter: Teachers who teach 1st and/or 2nd grade of *Ensino Fundamental*.

Color key

- Always
- Frequently
- Rarely
- Never or almost never

Initial difference (April): The treatment group had 34,5% positive responses, while the control group reached 43,6%, with a difference of -9,1 p.p. (***)

Change: The proportion of positive responses fluctuated from 34,5% to 38,5% (4,0 p.p.), while the control group decreased from 43,6% to 36,7% (-6,9 p.p. ***). The difference in evolution between the treatment and control group 1 was 10,9 p.p. **



Short-Term Impact

2. Survey

Short-Term Impact

Impact Analysis | 2. Survey for Teachers and Lead Educators

Short-Term
Impact

Question: To what extent do you agree or disagree with the following statements about this specific class?



A. Student Engagement

They respect the agreements established in the classroom.
+14,7 p.p. **

They are always present in my classes.
+19,4 p.p. ***

The students in this class help create a pleasant atmosphere for learning.
+12,2 p.p. *

I believe my students enjoy learning mathematics.
-1,3 p.p.

I believe my students have a certain level of mathematical ability that they cannot change.
-0,5 p.p.



B. Teacher Engagement

I consider myself a person passionate about mathematics.
+3,9 p.p.

I believe I demonstrate, through my teaching, how mathematics can be interesting.
-0,4 p.p.

I show enthusiasm for mathematics.
12,4 p.p. *

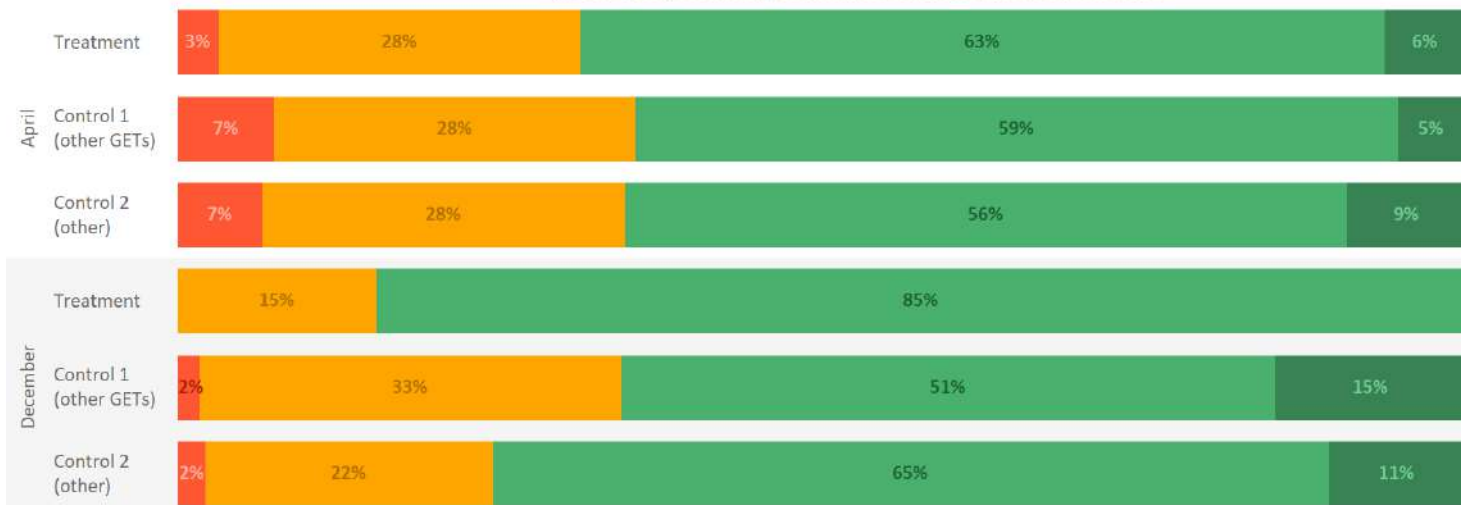


Values presented as '+X p.p.' represent the difference in variations between groups, where 'X' is the difference in percentage points. The symbols (*, **, ***) indicate the level of statistical confidence: * for 90%, ** for 95%, and *** for 99%. The absence of a symbol means the difference is not significant.

29. Short-Term Impact | Student Engagement

Distribution of the Percentage of Total Responses per Group and Application for the Question Item: *To what extent do you agree or disagree with the following statements about this specific class?*

(a) They respect the agreements established in the classroom.



Developed by: Germina. Source: Questionnaire administered to teachers of the Municipal Department of Education of Rio de Janeiro (April to May and December 2024). Filter: Teachers who teach 1st and/or 2nd grade of *Ensino Fundamental*.

Color key

- Strongly agree
- Agree
- Strongly disagree
- Disagree

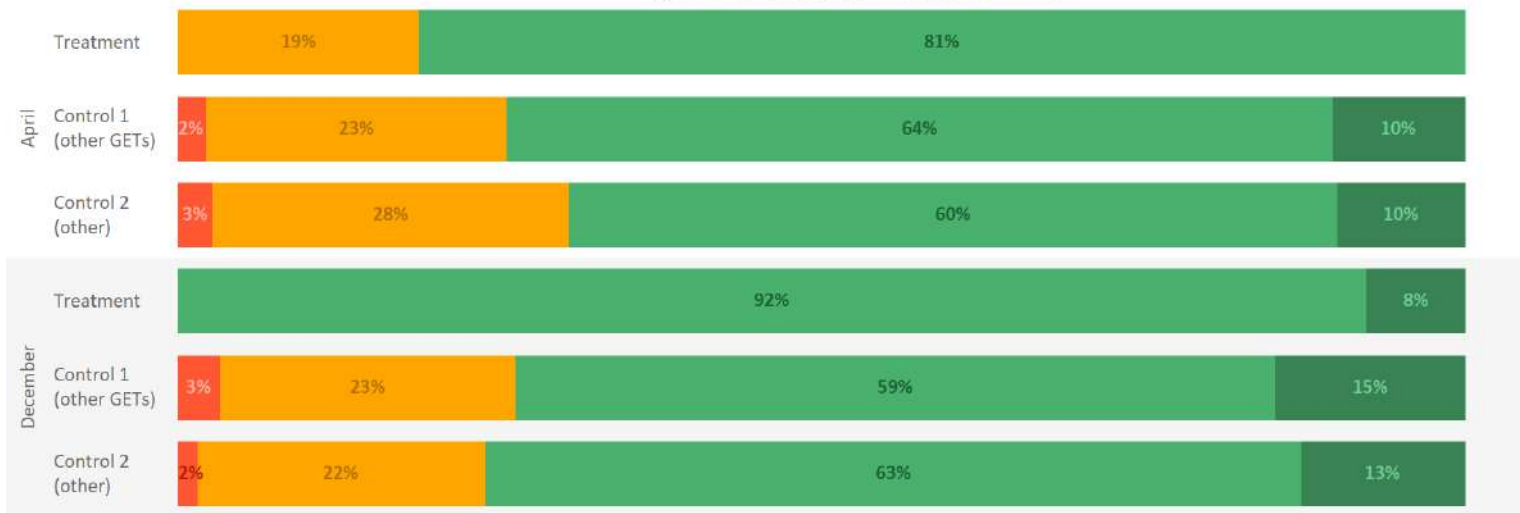
Initial difference (April): The treatment group had 68,8% positive responses, while the control group reached 64,4%, with a difference of 4,3 p.p. (**).

Change: The proportion of positive responses grew from 68,8 to 84,6% (15,9 p.p. ***), while the control group fluctuated from 64,4 to 65,6% (1,1 p.p.). The difference in evolution between the treatment and control group 1 was 14,7 p.p. **.

30. Short-Term Impact | Student Engagement

Distribution of the Percentage of Total Responses per Group and Application for the Question Item: *To what extent do you agree or disagree with the following statements about this specific class?*

(c) They are always present in my classes.



Developed by: Germina. Source: Questionnaire administered to teachers of the Municipal Department of Education of Rio de Janeiro (April to May and December 2024). Filter: Teachers who teach 1st and/or 2nd grade of *Ensino Fundamental*.

Color key

- Strongly agree
- Agree
- Strongly disagree
- Disagree

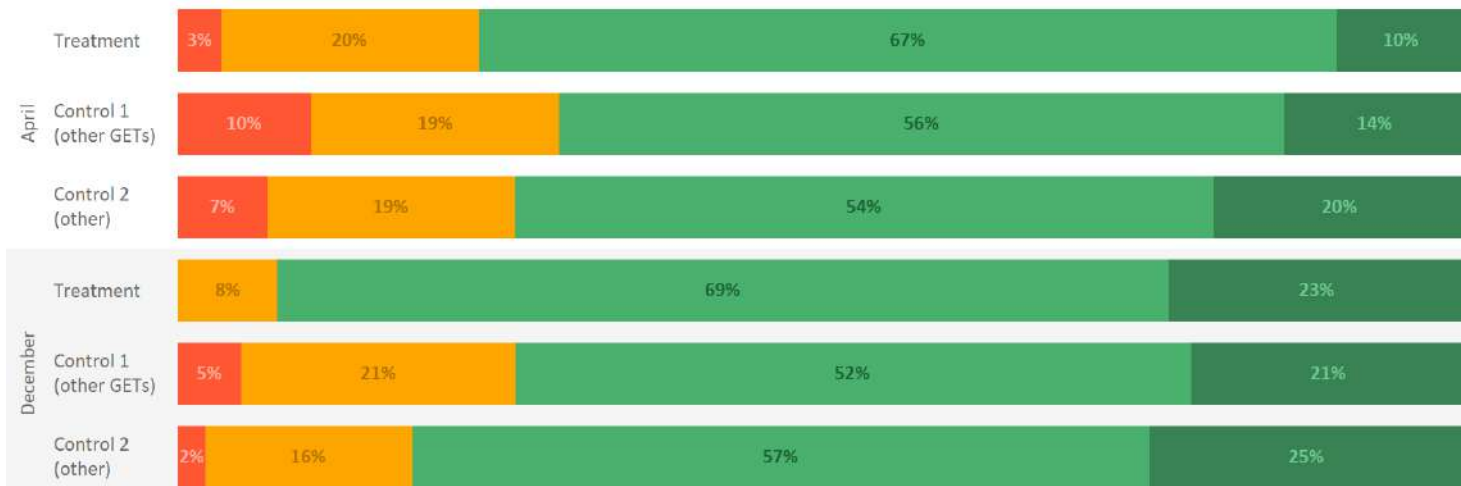
Initial difference (April): The treatment group had 81,3% positive responses, while the control group reached 74,5%, with a difference of 6,8 p.p. (***)

Change: The proportion of positive responses grew from 81,3% to 100,0% (18,8 p.p. ***), while the control group fluctuated from 74,5% to 73,8% (-0,7 p.p.). The difference in evolution between the treatment and control group 1 was 19,4 p.p. ***.

31. Short-Term Impact | Student Engagement

Distribution of the Percentage of Total Responses per Group and Application for the Question Item: *To what extent do you agree or disagree with the following statements about this specific class?*

(a) The students in this class help create a pleasant atmosphere for learning.



Developed by: Germina. Source: Questionnaire administered to teachers of the Municipal Department of Education of Rio de Janeiro (April to May and December 2024). Filter: Teachers who teach 1st and/or 2nd grade of *Ensino Fundamental*.

Color key

- Strongly agree
- Agree
- Strongly disagree
- Disagree

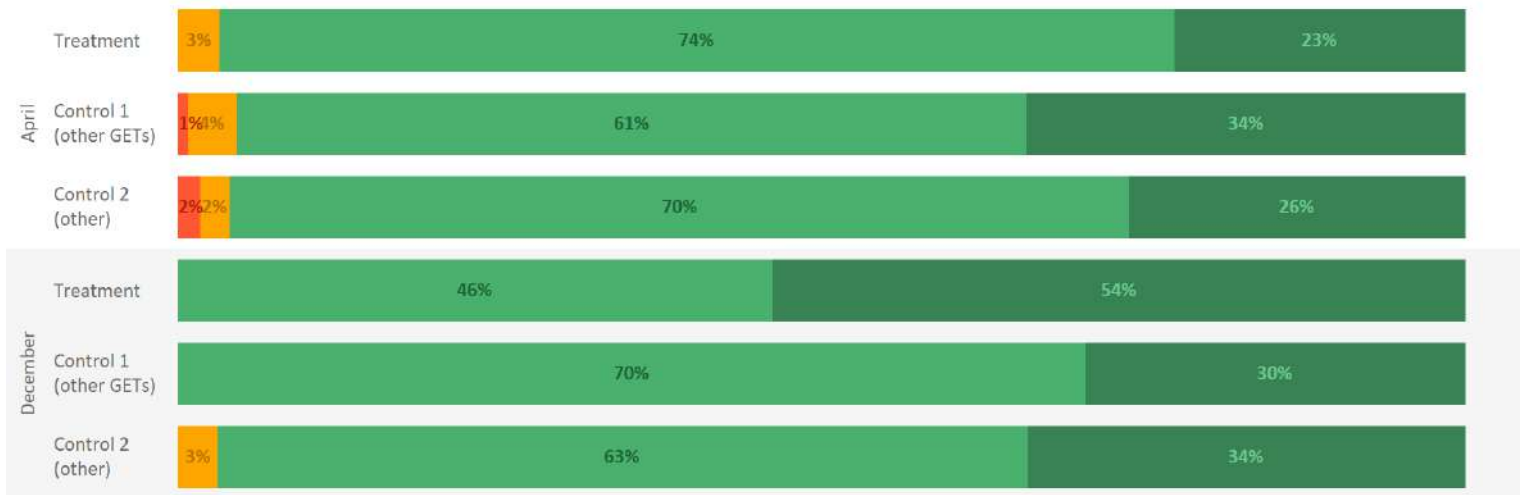
Initial difference (April): The treatment group had 76,7% positive responses, while the control group reached 70,4%, with a difference of 6,3 p.p. (***)

Change: The proportion of positive responses grew from 76,7% to 92,3% (15,6 p.p. **), while the control group grew from 70,4% to 73,8% (3,4 p.p. ***). The difference in evolution between the treatment and control group 1 was 12,2 p.p. *.

32. Short-Term Impact | Student Engagement

Distribution of the Percentage of Total Responses per Group and Application for the Question Item: *To what extent do you agree or disagree with the following statements about this specific class?*

(c) I believe my students enjoy learning mathematics.



Developed by: Germina. Source: Questionnaire administered to teachers of the Municipal Department of Education of Rio de Janeiro (April to May and December 2024). Filter: Teachers who teach 1st and/or 2nd grade of *Ensino Fundamental*.

Color key

- Strongly agree
- Agree
- Strongly disagree
- Disagree

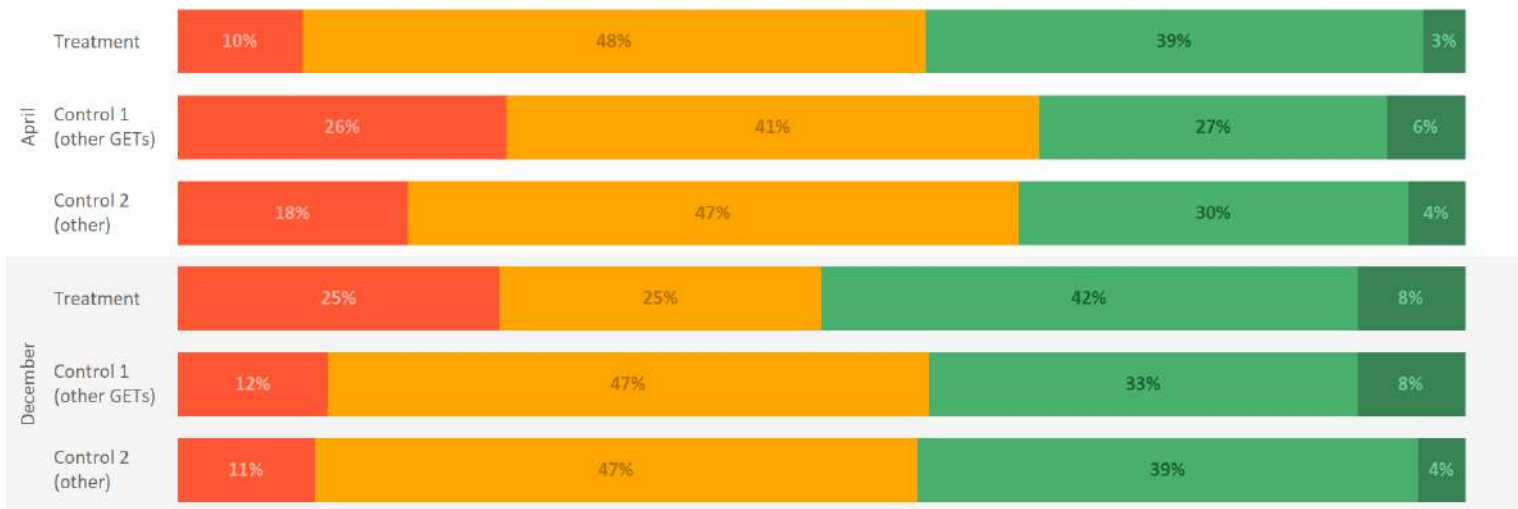
Initial difference (April): The treatment group had 96,8% positive responses, while the control group reached 95,5%, with a difference of 1,3 p.p.

Change: The proportion of positive responses fluctuated from 96,8% to 100,0% (3,2 p.p.), while the control group grew from 95,5% to 100,0% (4,6 p.p. ***). The difference in evolution between the treatment and control group 1 was -1,3 p.p.

33. Short-Term Impact | Student Engagement

Distribution of the Percentage of Total Responses per Group and Application for the Question Item: *To what extent do you agree or disagree with the following statements about this specific class?*

(a) I believe my students have a certain level of mathematical ability that they cannot change.



Developed by: Germina. Source: Questionnaire administered to teachers of the Municipal Department of Education of Rio de Janeiro (April to May and December 2024). Filter: Teachers who teach 1st and/or 2nd grade of *Ensino Fundamental*.

Color key

- Strongly agree
- Agree
- Strongly disagree
- Disagree

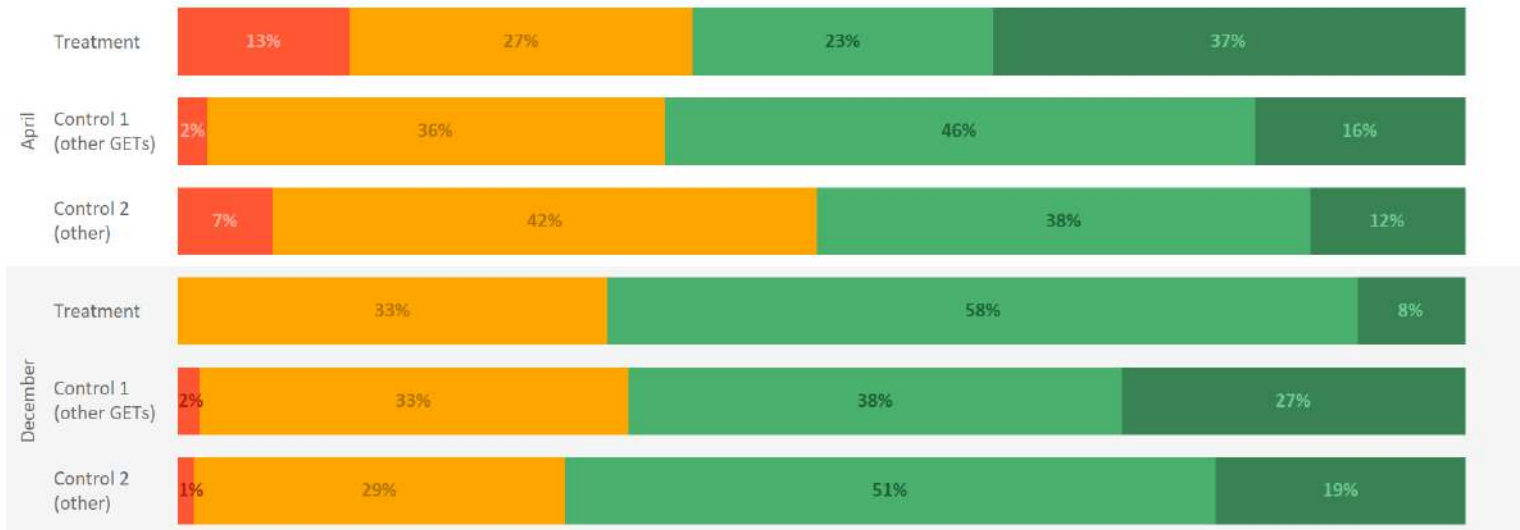
Initial difference (April): The treatment group had 41,9% positive responses, while the control group reached 33,1%, with a difference of 8,9 p.p. (***)

Change: The proportion of positive responses grew from 41,9% to 50,0% (8,1 p.p. *), while the control group grew from 33,1% to 41,7% (8,6 p.p. ***). The difference in evolution between the treatment and control group 1 was -0,5 p.p.

34. Short Term Impact | Teacher Engagemet

Distribution of the Percentage of Total Responses per Group and Application for the Item:

(b) I consider myself a person passionate about mathematics.



Developed by: Germina. Source: Questionnaire administered to teachers of the Municipal Department of Education of Rio de Janeiro (April to May and December 2024). Filter: Teachers who teach 1st and/or 2nd grade of *Ensino Fundamental*.

Color key

- Strongly agree
- Agree
- Strongly disagree
- Disagree

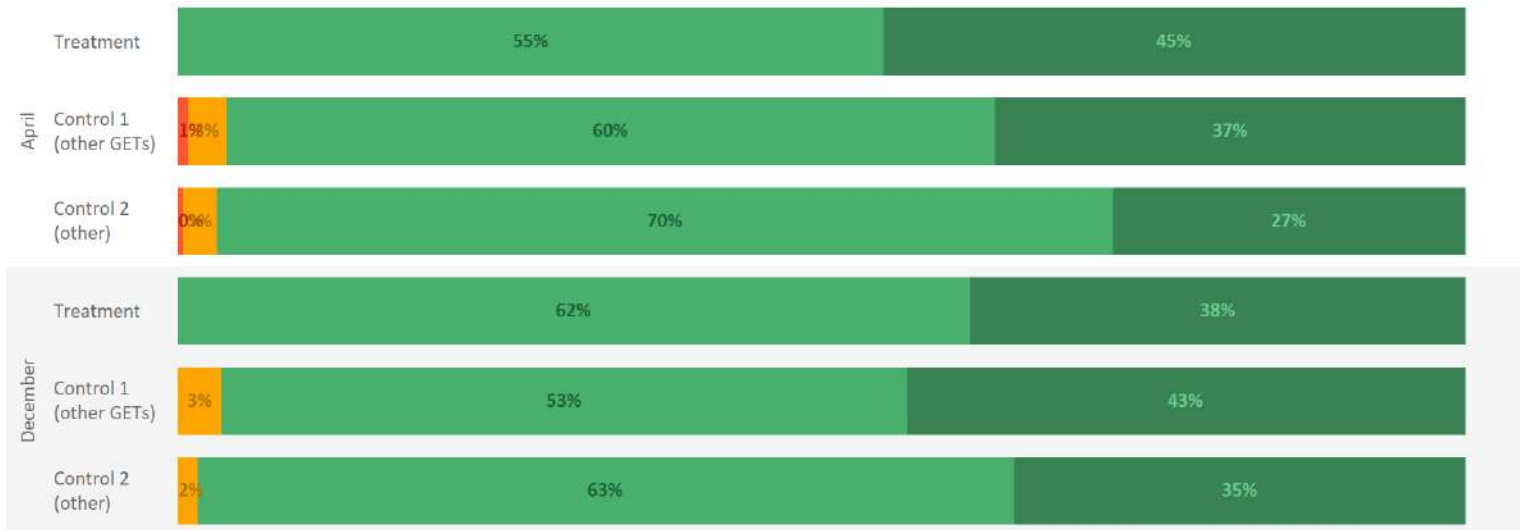
Initial difference (April): The treatment group had 60,0% positive responses, while the control group reached 62,2%, with a difference of -2,2 p.p.

Change: The proportion of positive responses fluctuated from 60,0% to 66,7% (6,7 p.p.), while the control group grew from 62,2% to 65,0% (2,8 p.p. **). The difference in evolution between the treatment and control group 1 was 3,9 p.p.

35. Short Term Impact | Teacher Engagemet

Distribution of the Percentage of Total Responses per Group and Application for the Item:

(c) I believe I demonstrate, through my teaching, how mathematics can be interesting.



Developed by: Germina. Source: Questionnaire administered to teachers of the Municipal Department of Education of Rio de Janeiro (April to May and December 2024). Filter: Teachers who teach 1st and/or 2nd grade of *Ensino Fundamental*.

Color key

- Strongly agree
- Agree
- Strongly disagree
- Disagree

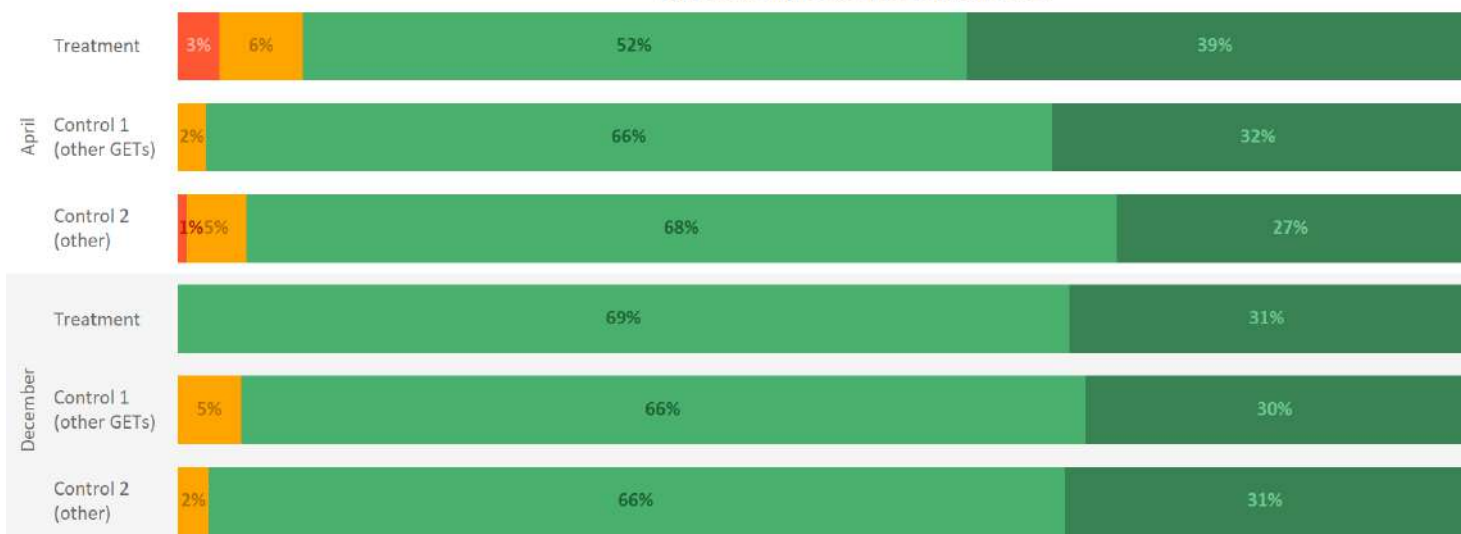
Initial difference (April): The treatment group had 100,0% positive responses, while the control group reached 96,3%, with a difference of 3,7 p.p. (*).

Change: The proportion of positive responses fluctuated from 100,0% to 100,0% (0,0 p.p.), while the control group fluctuated from 96,3% to 96,7% (0,4 p.p.). The difference in evolution between the treatment and control group 1 was -0,4 p.p.

36. Short Term Impact | Teacher Engagemet

Distribution of the Percentage of Total Responses per Group and Application for the Item:

(b) I show enthusiasm for mathematics.



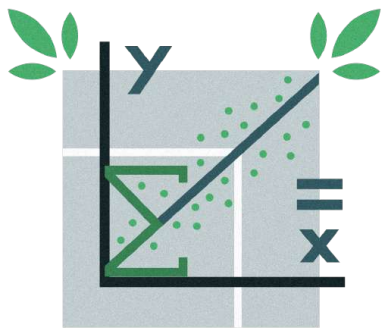
Developed by: Germina. Source: Questionnaire administered to teachers of the Municipal Department of Education of Rio de Janeiro (April to May and December 2024). Filter: Teachers who teach 1st and/or 2nd grade of *Ensino Fundamental*.

Color key

- Strongly agree
- Agree
- Strongly disagree
- Disagree

Initial difference (April): The treatment group had 90,3% positive responses, while the control group reached 97,8%, with a difference of -7,5 p.p. (***)

Change: The proportion of positive responses fluctuated from 90,3% to 100,0% (9,7 p.p.), while the control group decreased from 97,8% to 95,1% (-2,7 p.p. *). The difference in evolution between the treatment and control group 1 was 12,4 p.p. *.



3. Regional Diagnostic Activity Impact Analysis

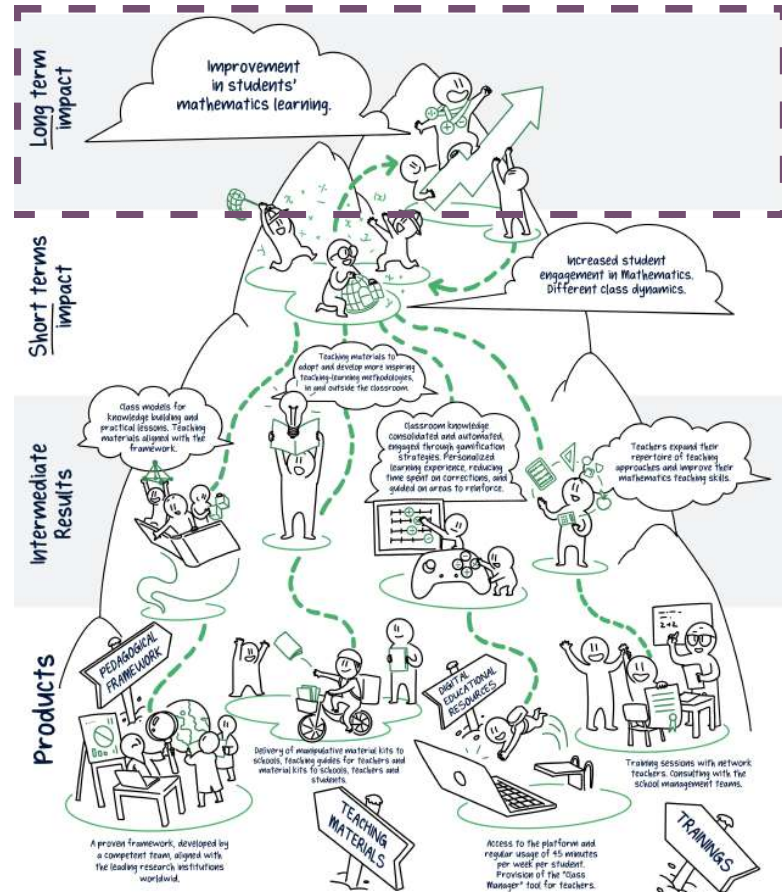
Climbing the Mountain: Mountain Peak

Improving student performance and mathematical understanding

The analysis of the **Regional Diagnostic Activity (ADR - Atividade Diagnóstica da Rede)** provides insights into the program's impact on student learning.

As the stage title suggests, noticeable **improvements in student performance in mathematics are expected in the long term**, given that the program operates indirectly — through school management and teacher practices rather than directly influencing students.

Nevertheless, monitoring student results in SMERJ's bimonthly assessments was considered relevant to identify potential program effects, even though the implementation lasted only one academic year.



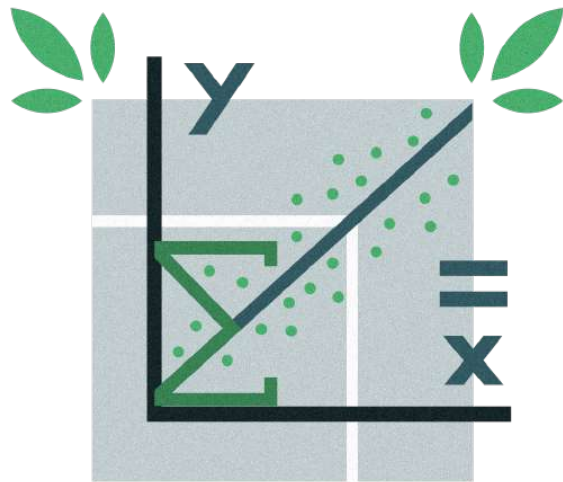


Methodology

Impact Analysis | 3. Regional Diagnostic Activity

As outlined in the methodological plan at the start of the program's implementation, the impact analysis block focused on student performance trends was conducted using multilevel Difference-in-Differences (DID) regression and *Propensity Score Matching (PSM)*. These methods were applied to ADR performance data from SMERJ's bimonthly assessments.

The choice of methodology allows for tracking performance evolution in the treatment group compared to various control groupings — classrooms from similar schools — mimicking a controlled experiment. This approach enables the attribution of a causal relationship between the program's implementation and the observed differences in the performance trajectories of the control and treatment groups.



001. County's Diagnostic Activity (ADR) | Sample

Student, Class and School participation, 1º Ano e 2º Ano in the assessment in Mathematics, year of 2024.



		Grade / Edition					
		1º Ano			2º Ano		
Grupo		1	2	3	1	2	3
Treated	Schools	5 Schools	5 Schools	5 Schools	5 Schools	5 Schools	5 Schools
	Classes	11 Classes	11 Classes	11 Classes	11 Classes	11 Classes	11 Classes
Untreated	Schools	2 Schools	2 Schools	2 Schools	2 Schools	2 Schools	2 Schools
	Classes	5 Classes	5 Classes	5 Classes	4 Classes	4 Classes	4 Classes
Control 1 (other GETs)	Schools	34 Schools	34 Schools	34 Schools	34 Schools	34 Schools	34 Schools
	Classes	94 Classes	95 Classes	94 Classes	88 Classes	88 Classes	88 Classes
Control 2 (all others)	Schools	296 Schools	245 Schools	245 Schools	299 Schools	248 Schools	248 Schools
	Classes	644 Classes	549 Classes	540 Classes	641 Classes	539 Classes	538 Classes
Students		276 Students	307 Students	316 Students	291 Students	311 Students	308 Students
Students		125 Students	134 Students	137 Students	108 Students	115 Students	114 Students
Students		2.323 Students	2.517 Students	2.524 Students	2.319 Students	2.431 Students	2.411 Students
Students		15.052 Students	13.890 Students	13.945 Students	15.914 Students	14.264 Students	14.260 Students

Elaborated by: Germina. **Source:** Coordenadoria de Avaliação (CAV) of County's Department of Education of Rio de Janeiro (SME-RJ), Atividade Diagnóstica em Rede - ADR (2023-2024), data from November 2024. **Filters:** 1º e 2º Anos do Ensino Fundamental de 9 Anos; shift Integral.

The performance evolution is assessed through its progress over four bimonthly assessments conducted throughout 2024. Using 4 distinct time points enhances the robustness of the test, following the DiD modelling approach. Additionally, the ADR data allow for a clear distinction between treated and untreated classrooms within each school, avoiding sample contamination. This distinction enables the inclusion of an additional control group in the case of the two "mixed" schools (which have both treated and untreated classrooms).

The availability of student-level data — used in the modelling — improves the model's consistency by accounting for variations at the smallest unit of analysis, given that proficiency is assigned at the student level for each assessment. Furthermore, as shown in the graph, the sample sizes remain substantial across all four assessments conducted in 2024.

Methodology

Impact Analysis | 3. Regional Diagnostic Activity

Control variables at the school and student levels were added to the model, in addition to the instrumental variable for identifying the class being treated.

The school-level variables — student flow, teacher training (DSU), average INSE, Indicador de Regularidade do Docente (IRD), Ideb e GET (yes or not) — did not show statistical significance ($\alpha = 5\%$) when modelled alongside the student-level variables provided by SMERJ—race/color¹ and financial aid (Bolsa Família or Cartão Família Carioca).

It is important to note that the learning objectives outlined in the Innovamat pedagogical framework emphasize higher cognitive levels, such as fluency, whereas the ADR assessments focus on lower cognitive levels, more aligned with Saeb. As a result, part of the program's impact may not be fully captured, since the assessment tool does not share the same scope.

¹ A variable was added to the model to distinguish self-identified Black, Brown, and Indigenous students (BBI) from other groups, including White, Asian (WA), and non-declared students.



Placebo Test

The ADR assessments cover Mathematics and Portuguese Language, for which data were obtained from SMERJ.

The availability of these Portuguese Language data allows for enhancing the methodology by incorporating a placebo test, increasing the robustness of the causal attribution of the observed effects.

Thus, the Mathematics performance coefficients—which fall within the program's scope—are analyzed alongside those of the Portuguese Language, enabling control for potential biases that may affect the treatment classrooms.

Mathematics

OLS Regression Results						
Dep. Variable:	VL_PROFICIENCIA	R-squared:	0.078			
Model:	OLS	Adj. R-squared:	0.078			
Method:	Least Squares	F-statistic:	274.1			
Date:	Wed, 29 Jan 2025	Prob (F-statistic):	0.00			
Time:	11:59:44	Log-Likelihood:	-72205.			
No. Observations:	51002	AIC:	1.444e+05			
Df Residuals:	51005	BIC:	1.446e+05			
Df Model:	16					
Covariance Type:	nonrobust					
	coef	std err	t	P> t	[0.025	0.975]
Intercept	-0.7285	0.027	-26.792	0.000	-0.782	-0.675
AUXILIO[T.1]	0.0183	0.010	1.892	0.059	-0.001	0.037
TREATED_CLASS	0.0511	0.087	0.589	0.556	-0.119	0.221
EDITION	0.3309	0.005	63.679	0.000	0.327	0.347
TREATED_CLASS:EDITION	-0.0413	0.039	-1.055	0.291	-0.118	0.035
PPI	-0.0837	0.010	-8.585	0.000	-0.103	-0.065
DECLARACAO	0.1180	0.014	8.367	0.000	0.090	0.146
Omnibus:	12894.740	Durbin-Watson:	1.789			
Prob(Omnibus):	0.000	Jarque-Bera (JB):	25412.788			
Skew:	-1.543	Prob(JB):	0.00			
Kurtosis:	4.496	Cond. No.	57.1			

Portuguese Language

OLS Regression Results						
Dep. Variable:	VL_PROFICIENCIA	R-squared:	0.057			
Model:	OLS	Adj. R-squared:	0.057			
Method:	Least Squares	F-statistic:	197.4			
Date:	Wed, 29 Jan 2025	Prob (F-statistic):	0.00			
Time:	12:01:17	Log-Likelihood:	-70077.			
No. Observations:	51918	AIC:	1.402e+05			
Df Residuals:	51901	BIC:	1.403e+05			
Df Model:	16					
Covariance Type:	nonrobust					
	coef	std err	t	P> t	[0.025	0.975]
Intercept	-0.6688	0.026	-25.658	0.000	-0.720	-0.618
AUXILIO[T.1]	-0.0021	0.009	-0.221	0.825	-0.020	0.016
TREATED_CLASS	0.0075	0.083	0.090	0.929	-0.156	0.171
EDITION	0.2631	0.005	51.898	0.000	0.253	0.273
TREATED_CLASS:EDITION	-0.0412	0.038	-1.091	0.275	-0.115	0.033
PPI	-0.0580	0.009	-6.209	0.000	-0.076	-0.040
DECLARACAO	0.1117	0.014	8.263	0.000	0.085	0.138
Omnibus:	11110.430	Durbin-Watson:	1.733			
Prob(Omnibus):	0.000	Jarque-Bera (JB):	19867.343			
Skew:	-1.402	Prob(JB):	0.00			
Kurtosis:	4.150	Cond. No.	57.2			



As observed in the regression summary¹, the coefficients for the instrumental variables identifying treatment ("TREATED_CLASS") did not show statistical significance². This indicates that **no observable effects of the first year of program implementation can be detected regarding its main long-term objective**. The positive values of the treatment coefficient in both Portuguese Language (LP) and Mathematics (MT) suggest that treated classrooms initially performed better than non-treated classrooms at the start of the program. However, this difference is not statistically significant. Similarly, the coefficient for the time interaction variable ("TREATED_CLASS: EDITION") suggests that treated classrooms may have experienced a relative performance decline during implementation. However, these coefficients were also not significant and appeared in the placebo analysis as well.

¹ Dummy variable coefficients identifying each Regional Education Coordination (CRE) were omitted from the output, as they were not relevant to the analysis.

² Three sensitivity tests confirmed the consistency of the findings: (1) Multilevel regression model with CRE and school identifiers produced similar coefficients, which were significant but identical to the placebo; (2) Ordinary Least Squares (OLS) model for the two mixed schools (with both treated and untreated classrooms) found no significance in the instrumental variables, despite a substantial sample of 400 students; and, (3) Mean variation tests for the treatment and control groups showed statistical significance but with coefficients identical to the placebo.

Long-Term Impact

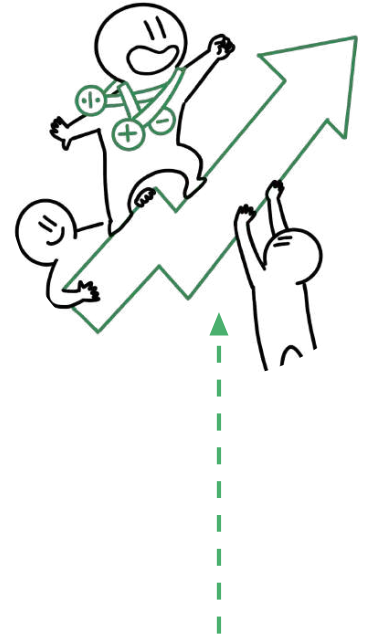
Impact Analysis | 3. Regional Diagnostic Activity

Long-Term
Impact



Improvement in students' mathematics learning

The impact on the performance of students treated during the 2024 academic year could not— or has not yet—been observed.
+0,0007 (not statistically significant)



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This value represents the difference in standard deviations of the estimated program effect coefficient on the mathematics performance of treated students, minus the placebo coefficient from Portuguese Language performance.



Final summary

Impact Analysis

Analysis summary

Impact Analysis | Innovamat & SMERJ 2024

The consolidated view of the three methodological approaches, used throughout the 2024 academic year, indicates a **positive overall outcome for the program**.

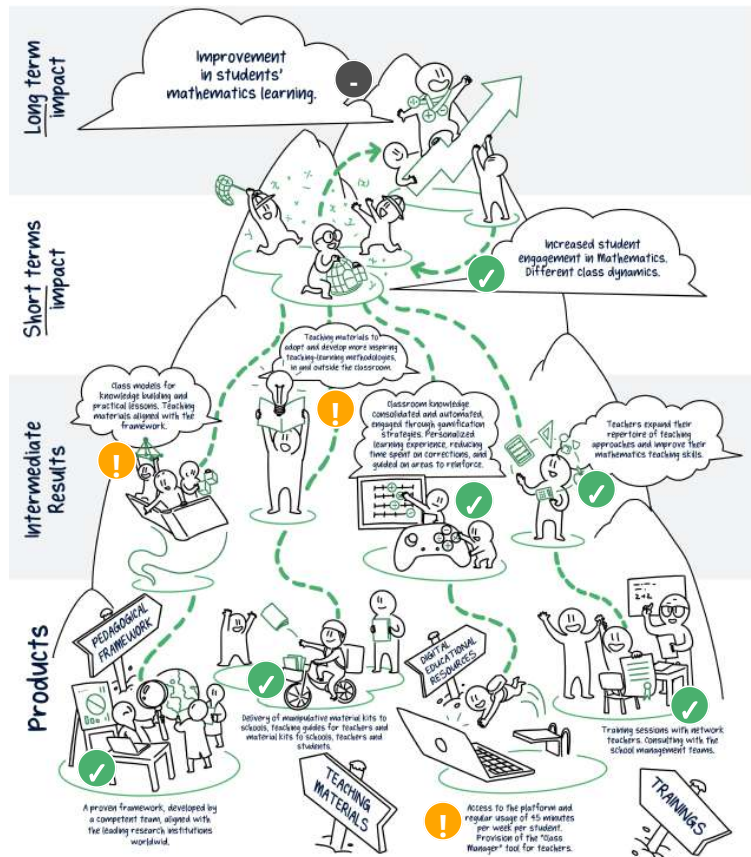
It is understood that the program successfully delivered its expected outputs, as outlined in the Theory of Change, with evidence of the incorporation of methodologies, materials, and technologies into teaching practices in participating schools.

Teachers' statements in interviews and their responses to the forms suggest a perception that the program has **positively impacted students' relationship with mathematics**.

In terms of performance, however, these results are not yet observable. This is partly because the program operates in a way that indirectly influences the students' learning process. Therefore, the model may generate positive effects in the future — but these have not yet been identified in the first year.

In general, **the program largely complied with the Theory of Change**, with only minor adjustments needed for improvement.

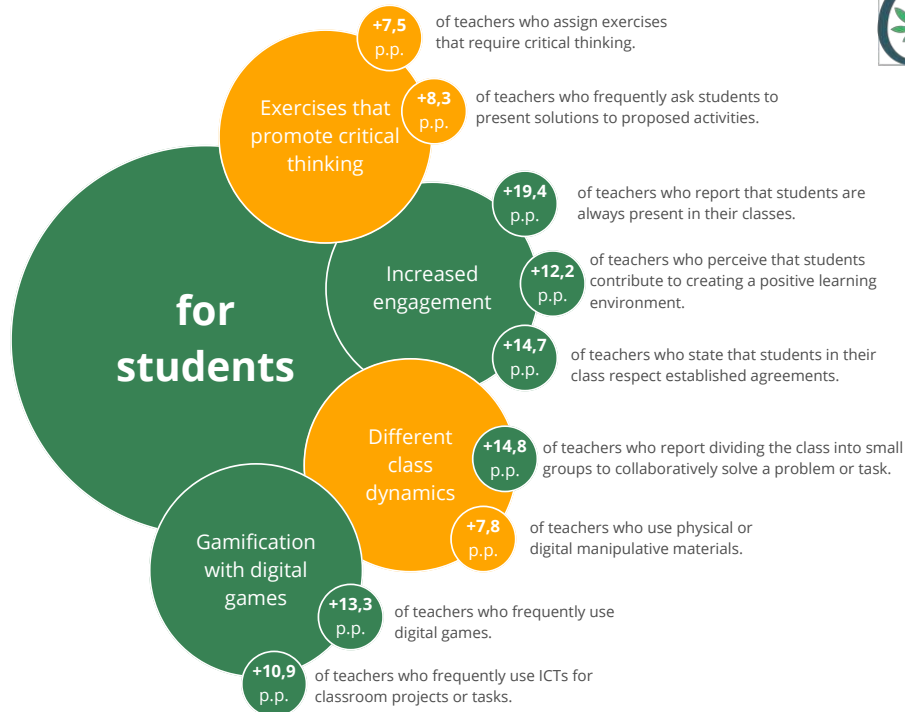
Therefore, the continuity of the program, with some refinements to ensure the full delivery of outputs and outcomes, represents a mechanism that can improve student performance in the long run.





Achievements

Impact Analysis | Final summary

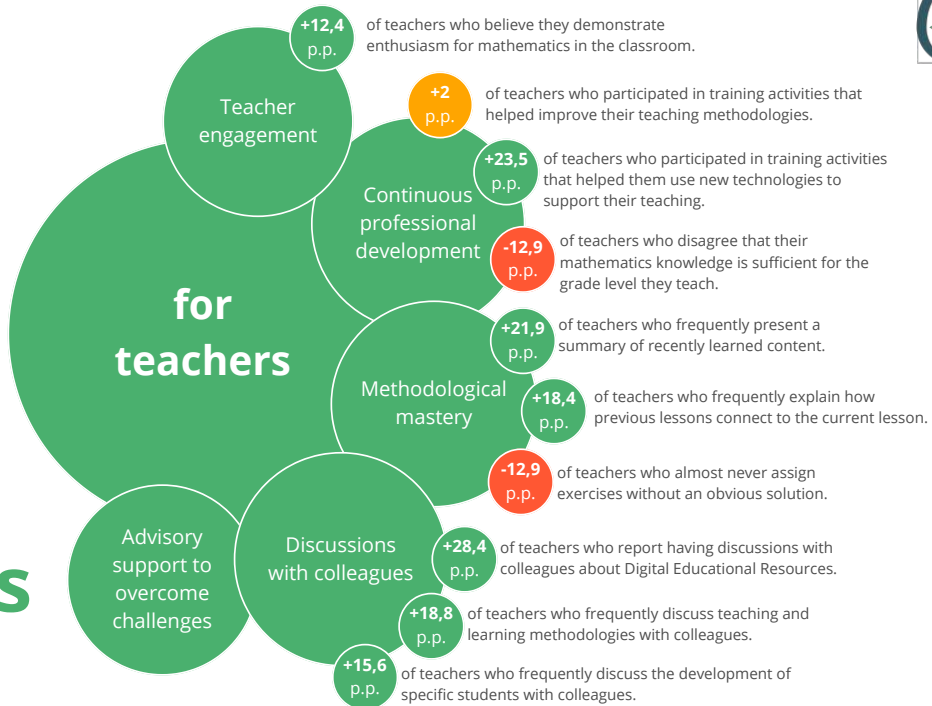


Note: The percentage points (p.p.) represent the relative variation between the treatment group and Control Group 1. Results that lack statistical significance are highlighted in yellow.



Achievements

Impact Analysis | Final summary



Note: The percentage points (p.p.) represent the relative variation between the treatment group and Control Group 1. Results that lack statistical significance are highlighted in yellow.

General Perspective

Impact Analysis | Final summary



**"The teachers liked the project,
but not its organization"**

Challenges:

- Aligning SMERJ curricula and materials with Innovamat lesson plan.
- Availability of technological resources and students' computer skills.
- Initial adaptation costs (a challenge common to most programs).

**"I'm learning a lot,
and so are they."**

Highlights:

- Teachers expanded their teaching repertoire.
- Advisory team assists with adaptations.
- Increased student interest in math classes.
- Students learn to think in different ways.



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