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Developing Collective Impact to Improve Foundational Learning: Evidence from Madagascar After the COVID-19 Pandemic Shock

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Developing Collective Impact to Improve Foundational Learning: Evidence from Madagascar After the COVID-19 Pandemic Shock

Takao Maruyama^{*} and Kengo Igei[†]

Abstract

After the school closures due to the COVID-19 pandemic, the recovery of foundational skills such as numeracy became a priority policy agenda in sub-Saharan Africa. In Madagascar, the Ministry of Education began scaling-up training on the pedagogical approach to numeracy, called “Teaching at the Right Level (TaRL),” for primary teachers and community volunteers. This training was part of a package of interventions that aimed at strengthening the capacity of the school management committee (SMC) to lead extra-curricular remedial activities. In parallel with the process of scaling up the package for primary schools, the Ministry organized a public education forum in the region to develop collaboration among different actors, such as educational administration and local governments, to improve foundational skills. As these interventions were scaled up progressively to increase their coverage of the regions, we used the settings to investigate their impact on numeracy for primary students, employing a difference-in-differences strategy. Specifically, we targeted the neighboring regions with similar social backgrounds and conducted a survey for those schools situated in communes near regional border. TaRL training plus the public education forum improved learning outcomes in numbers and four basic operations by 0.37 standard deviations. The collaboration of different actors to improve foundational skills in Madagascar shows an example of collective impact to address learning crisis in low-income country.

JEL classification: I28 and O15.

Keywords: Educational development; COVID-19 pandemic, Math learning; School management, Sub-Saharan Africa.

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1. Introduction

COVID-19 disrupted education worldwide, especially in low-income countries (UNICEF 2021). In sub-Saharan Africa, the learning crisis was severe even before the COVID-19 pandemic. More than 80 percent of primary last-grade students do not reach a minimum proficiency level in language and mathematics (UNESCO 2017). The closure of primary schools due to the COVID-19 pandemic worsened this situation (Angrist et al. 2021; Ardington et al. 2021; Moscoviz and Evans 2022). Basic reading and math are foundational skills for children, and this learning crisis will therefore have a long-term negative socio-economic impact (Azevedo et al. 2021). Thus, it is urgently necessary to take action to improve learning at scale (World Bank, UNESCO, and UNICEF 2021).

In Madagascar, the Ministry of Education began training for teachers and community volunteers on the pedagogy of foundational literacy and numeracy in several regions from the 2020-2021 school year. The training employed the pedagogical approach called “Teaching at the Right Level” (TaRL), which was developed by the Indian NGO “Pratham.” In TaRL, students are grouped by the assessment results and learn foundational literacy and math skills through various activities (Pratham 2020). The TaRL training was a part of the package of interventions called “PMAQ-TaRL,” which was developed with technical cooperation from the Japan International Cooperation Agency (JICA).¹ In addition to the pedagogical component, PMAQ-TaRL included a school management component to improve the functionality of SMCs. The component comprised a series of training sessions to strengthen the capacity of school management committees (SMCs) to lead the school action plan cycle.

After the impact was verified in a pilot through a randomized controlled trial (Maruyama and Igei Forthcoming), the Ministry of Education began the process of scaling-up PMAQ-TaRL for primary schools. In the 2021-2022 school year, in parallel with the process of scaling-up of the package of interventions, the regional educational office of the Ministry organized a public education forum with technical cooperation from JICA. In this forum, different actors, including representatives of the SMCs, local educational administration, and local government discussed the problem of foundational skills to set the objectives to be achieved through their own activities (Regional Educational Office in Amoron’i Mania 2021; Regional Educational Office in Haute Matsiatra 2021). The public education forum aimed to mobilize different stakeholders to take action to improve the foundational skills of children.

¹ PMAQ is the abbreviation of “Paquet Minimum Axé sur la Qualité” (minimum package for quality learning). The package was originally developed in Niger and adapted to the local context of Madagascar with technical cooperation from JICA (Hara et al. 2020).

This study investigates the impact of these scaled-up interventions on foundational learning, targeting two neighboring regions in the south-central highlands of Madagascar, Amoron'i Mania and Haute Matsiatra. The two regions were created from the same province in 2004 and have shared socio-economic characteristics. From the 2019-2020 school year, the Ministry of Education began the scaling up of interventions for the two regions stepwise but with different timelines. Amoron'i Mania region received interventions one school year earlier than Haute Matsiatra. We used this phase-in design of the project plan to evaluate the impact of the scaled-up interventions by a difference-in-differences strategy.

This study is the follow-up to our previous study conducted in the two regions in the 2020-2021 school year (Maruyama and Igei 2023). For the present study, we tracked those students who were in grade 3 in the 2020-2021 school year in the following school year.

This study contributes to the extension of literature on educational development by rigorously evaluating the scaled-up interventions that sought to develop collective impact. Collective impact is a model for collaboration among different actors, including the local government and communities, to address large scale and complex social problems (Kania and Kramer 2011). The scale of the learning crisis in low-income countries is large, as more than 80 percent of children are not acquiring the foundational skills in primary education (UIS 2017). The learning crisis is also a complex issue as the challenges to improve the foundational skills in the countries are multi-dimensional, involving different types of actors such as parents, teachers, and local community members (World Bank 2018). Considering the scale and complexity of the learning crisis in the low-income countries, it would be necessary to align and strengthen the activities of different types of actors to address the issue.

In the model of collective impact, different actors set a common agenda to be solved through their coordinated actions. In the case of Madagascar, representatives of different groups in Amoron'i Mania discussed student math learning based on the assessment data and set the objectives to be achieved through their actions in the public education forum (Regional Educational Office in Amoron'i Mania 2022). After the forum, the participants shared the results with the other members of their group and developed an action plan. The local educational offices conducted TaRL training for teachers and community volunteers. With the foundation of improved functionality of SMCs, the TaRL training plus the organization of the public education forum improved the learning outcomes in numbers and the four basic operations by 0.37 standard deviations. While the impacts of scaled-up interventions were evaluated in education (Banerjee et al. 2017; Bold et al. 2018; De Ree et al. 2018; Muralidharan and Singh 2023), to the best of our knowledge, the interventions designed to

develop collective impact in education has not been rigorously evaluated to date.

This study also examined the process of developing the collective impact in the context of low-income country, using survey data. While previous studies have reported on cases of collective impact in education in developed countries (Hanleybrown et al. 2012; FSG 2013; Edmondson and Zimpher 2014; Smart 2017), the examples are still scarce in low-income countries. The process of developing collective impact in education in the context of low-income countries has not been much studied. In the case of Madagascar, the process to develop collective impact comprised the following three steps: (1) decisions on the objectives and actions at the regional forum; (2) information-sharing and discussions on the agreed objectives at the commune and the school levels; and (3) implementation of activities at the school and local community level to address the agreed objectives. Reflecting the difference in the topics of the agenda and agreed objectives in the public education forums in the two regions, the schools organized the extra-curricular remedial activities on math in Amoron'i Mania and on basic reading in Haute Matsiatra.

We tracked the activities of SMCs for two school years and examined whether they continued to function to organize joint action involving the school and the local community. While the previous literature studied different types of interventions targeting SMCs in sub-Saharan Africa in the short run (Blimpo et al. 2015; Duflo et al. 2015; Beasley and Huillery 2016; Car-Hill et al. 2018), the sustainability of the functionality of SMCs has not been well examined. In Amoron'i Mania, school management training of PMAQ-TaRL was provided for primary schools in the 2019-2020 school year. After two years, the functionality of the SMCs was sustained, and school action plans were implemented through collaboration between the school and the local community.

The remainder of this paper is organized into the following four sections. Section 2 describes the content of the interventions to develop collective impact to improve foundational learning and explains the evaluation design of this study. Section 3 reports the estimated impact of the interventions on foundational learning. Section 4 reviews the process of developing collective impact to improve foundational learning from the survey data, and Section 5 concludes.

2. Evaluation Strategy

2.1 Content and timeline of interventions

In Madagascar, the learning crisis was severe before the COVID-19 pandemic happened. Approximately 80 percent of students in the last grade (grade 5) of primary education did not

reach the minimum proficiency level of math (PASEC 2017, 2020). For learning recovery after the school closures due to the pandemic, the education offices in Amoron'i Mania and Haute Matsiatra organized the public education forum in the 2021-2022 school year in their regions with the technical assistance of JICA (Regional Educational Office in Amoron'i Mania 2021; Regional Educational Office in Haute Matsiatra 2021). The topics discussed in the forum were math learning in Amoron'i Mania and basic reading in Haute Matsiatra. The objectives agreed upon at the forum were "at least 40 percentage points increase in the proportion of students who are able to do addition, subtraction, multiplication, and division" in Amoron'i Mania and "achieving a level of more than 60 percent of students mastering basic reading" in Haute Matsiatra. The strategy to realize the objectives was the organization of extra-curricular remedial activities using TaRL.²

The results of the discussions in the regional forum, including the agreed objectives, were shared with local actors in a stepwise manner and further discussed. For example, the SMC federations took the responsibility of organizing the general assembly to share and discuss the results of the forum with the representatives of the member SMCs.³ The SMCs were then in charge of developing a school action plan, including the organization of extra-curricular remedial activities, through information-sharing and discussions at the community general assembly. The remedial activities aimed to help grade 2 through 5 students improve their foundational learning.

In the regional forum, the local educational administration committed to organizing training for teachers and community volunteers to improve their pedagogical skills related to the agreed objectives (Regional Educational Office in Amoron'i Mania 2022; Regional Educational Office in Haute Matsiatra 2022). In Madagascar, local education officers, called the "ZAP leaders (*Chefs de Zones Administratives et Pédagogiques*)", traditionally organize teacher training, called "*Journée Pédagogique*" (hereinafter referred to as "JP" or "JP training"), once in a semester in each local educational area of ZAP. The participation of teachers in JP training is mandatory, and the ZAP leaders select the topics of the training. On the occasion of JP, TaRL training was provided for teachers and community volunteers on math in Amoron'i Mania and

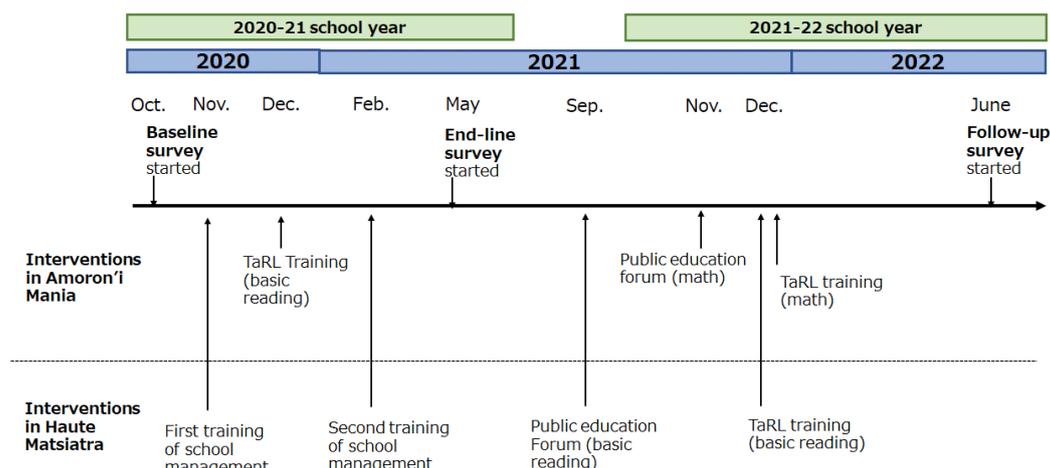
² The agreed objectives also included the number of hours for extra-curricular remedial activities: at least eight hours per week from January to April 2022 in both regions.

³ The SMC federation is a voluntary association of SMCs in a few educational administration zones that takes different roles, including (a) collecting and disseminating information among its member SMCs, (b) facilitating member cooperation, and (c) liaising with the local education office or local government (Kunieda et al., 2020).

on basic reading in Haute Matsiatra in December 2021.⁴ For the primary schools in Amoron'i Mania, the TaRL training on basic reading was conducted in the previous school year (Maruyama and Igei 2023). The timeline of the events before and after the organization of the public education forum is shown in Figure 1.

Before the organization of the public education forum, two sessions of training on school management were provided for all the public primary schools in Amoron'i Mania in the 2019-2020 school year and in Haute Matsiatra in the 2020-2021 school year (Figure 1). The first training was for school principals on the democratic establishment of SMCs. They were trained on how to establish SMC by secret ballot. The second training was for the president, secretary (school principal), and accountant of the SMC on the development of the school action plan and resource management.⁵

Figure 1: Timeline of interventions in the Amoron'i Mania and Haute Matsiatra regions



Note: In Amoron'i Mania, two sessions of training of school management were provided in the 2019-2020 school year.

The regional educational office in Amoron'i Mania collected school-level assessment data for math in the 2020-2021 and 2021-2022 school years. Schools in the region conducted the assessment on numbers and the four basic operations, using the Annual Status of Education Report (ASER) tool. The ASER tool was developed by the Indian NGO “Pratham” (ASER

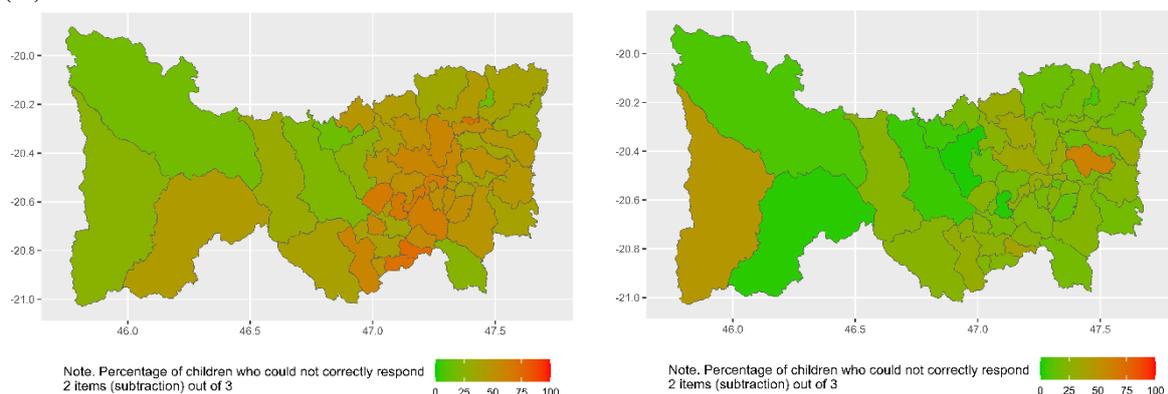
⁴ For TaRL training on the occasion of JP, the Ministry of Education conducted a training of trainers for ZAP leaders with the technical cooperation of JICA.

⁵ Out of the 65 sampled schools on the Amoron'i Mania side, 63 participated in the first training, and all received the second training of school management. On the Haute Matsiatra side, all the 65 sampled schools received two sessions of training in school management.

Center 2015). The tool comprised the number recognition section and the basic four operations section. Figure 2 depicts the situation of the student math learning for grade 3 and 4 students at the commune level.^{6,7} In Figure 2 (B), the communes where a large proportion of students could not correctly respond to division problems were colored red. Conversely, the communes where a small proportion of those students were colored green.

Figure 2: Situation of math learning (subtraction and division) in Amoron'i Mania in 2021 and 2022 (Grade 3 and 4 students)

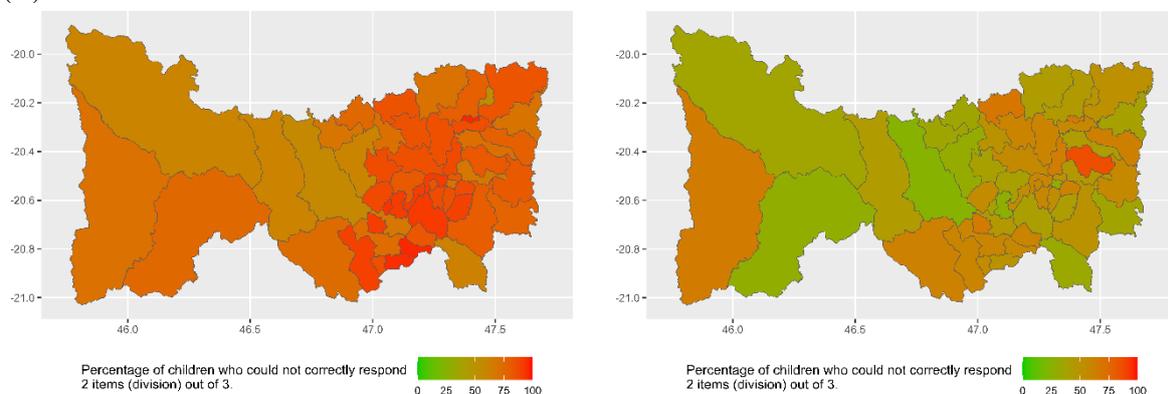
(A) Subtraction items



(a) May 2021

(b) May 2022

(B) Division items



(a) May 2021

(b) May 2022

Note: Figures include the students from grades 3 and 4. The number of students was 47039 in May 2021 (a) and 45424 in May 2022 (b) in the 1027 schools. The data source is the TaFita project. The assessment was conducted by the schools using the ASER tool. In the subtraction and division subsections, the ASER tool included three items. The subtraction items were two-digit with carrying, and the division items included division with remainders. Teachers or students chose two out of the three, and students answered them.

⁶ In Madagascar, the repetition rate is relatively high in primary education. As we tracked the students who were in grade 3 in the 2020-2021 school year in the following school year for our survey, Figure 2 includes grade 3 and 4 students in the 2020-2021 and 2021-2022 school years.

⁷ The school-level assessment data for basic reading in Haute Matsiatra is presented in Figure A1 (Appendix 2).

While we observe the progress of student math learning across the region in Amoron'i Mania from Figure 2, the improvement would have included the change in learning outcomes over time. Students would have progressed their math learning through regular classes even without the interventions. The different compositions of students in the two school years also affected the results. As the school year begins in October and ends in July in the next year in Madagascar and Figure 2 is based on the school-level assessment data, the figure does not compare the situation of math learning of the same students. The improvement observed in Figure 2 might have included the change of student compositions in the school-level assessment data over the two school years. Thus, as explained in the following sub-sections, we investigate the impact of interventions in the 2021-2022 school year by a difference-in-differences strategy, using the student panel data from our survey. The learning outcomes on numbers and the basic four operations are measured by the math test developed for this survey.

2.2 Evaluation design

Amoron'i Mania and Haute Matsiatra are neighboring regions which were created from the same province in 2004 (World Bank 2017). The majority of people in the two regions belong to the ethnic group, the *Betsileo* (CREAM 2013a, 2013b). More than 70 percent of people in the two regions work in agriculture, such as rice farming and livestock, and more than 80 percent of the population live in poverty in both regions (CREAM 2013a, 2013b; INSTAT 2019, 2020). The educational statistics in the two regions were at a similar level (INSTAT 2019). For example, the passing rate of the certification exam of primary education was 49.4 percent in Amoron'i Mania and 53.2 percent in Haute Matsiatra in the 2018–2019 school year (Ministry of Education in Madagascar 2019c). The primary net enrolment rate was 76.1 percent (boys) and 84.4 percent (girls) in Amoron'i Mania and 82.4 percent (boys) and 87.5 percent (girls) in Haute Matsiatra (INSTAT 2019).

While the socio-economic characteristics of the Amoron'i Mania and Haute Matsiatra regions were similar, we targeted the communes near the common border of the two regions for our survey (Figure 3).⁸ Out of the 120 schools on the Amoron'i Mania side and the 118 schools on the Haute Matsiatra side, we randomly sampled 65 schools from each side, in total, 130 schools.⁹ The average participation rate of teachers per school for TaRL training in the 2021-2022 school year was 91.1 percent for the Amoron'i Mania side and 88.7 percent for the Haute

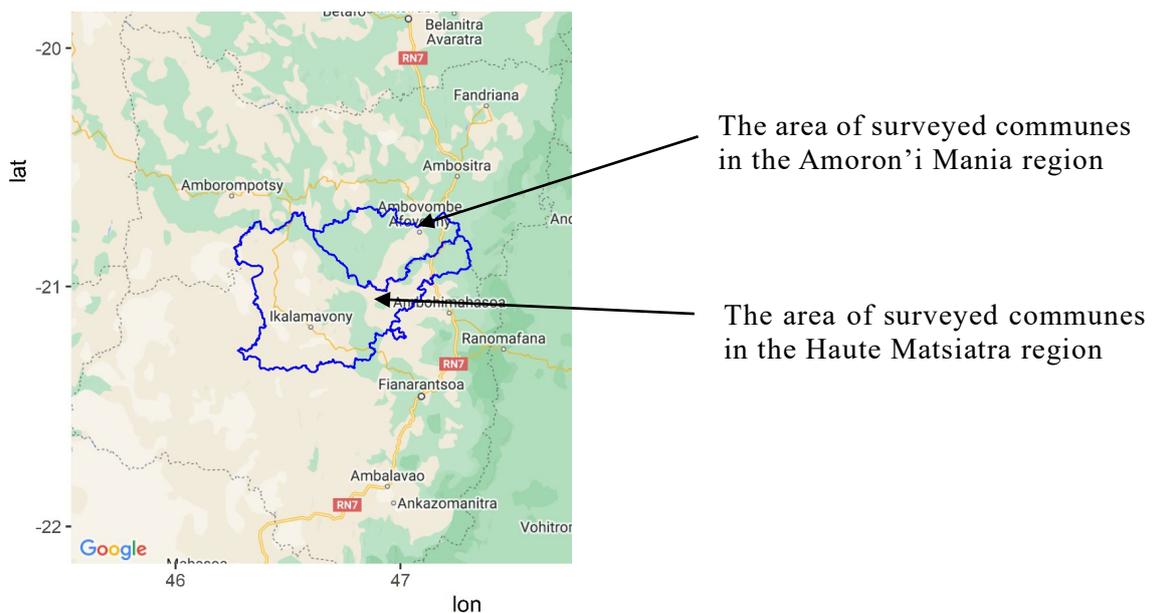
⁸ Seven communes in the Amoron'i Mania region and nine communes in the Haute Matsiatra region were targeted for the survey. We excluded those schools in Amoron'i Mania that were targeted in the RCT from the sampling frame for this study.

⁹ Out of the 65 schools in Amoron'i Mania, there was one that did not have both grade 3 and 4 students. Additionally, ten schools were randomly sampled from outside the communes near the regional border in Amoron'i Mania.

Matsiatra side.¹⁰

In Madagascar, the school year starts in October and ends in July of the next year.¹¹ In our research, we conducted the baseline survey from October to December 2020, the end-line survey from May to June 2021, and the follow-up survey from May to June 2022 (Figure 1).¹² In the baseline and end-line surveys, grade 2 through 4 students were targeted. In the follow-up survey, we tracked students who were in grade 3 in the 2020-2021 school year. Maruyama and Igei (2023) used baseline and end-line survey data to evaluate the impact of the scaled-up interventions in the 2020-2021 school year. This paper mainly uses end-line and follow-up survey data to investigate the impact of the scaled-up interventions on math learning in the 2021-2022 school year.

Figure 3: Location of the area of the surveyed communes



Source: Google Maps (2022).

Of the 3157 students who were in grade 3 in the end-line survey, 223 students were absent in the follow-up survey. When we regressed the attrition dummy on the region dummy for Amoron'i Mania, student baseline characteristics, and the baseline values of the learning

¹⁰ Approximately 93 percent of teachers of the 65 schools on the Amoron'i Mania side participated in TaRL training (basic reading) in the 2020-2021 school year.

¹¹ The 2021-2022 school year began in September 2021.

¹² The surveys were conducted based on the agreement signed on February 2020 for the TaFita project between the Ministry of Education in Madagascar and JICA.

outcomes, the coefficient of the region dummy variable was estimated at -0.038, which was statistically significant (see Appendix 1).¹³ In our empirical strategy, we address sample attrition by estimating the Lee bounds (Lee 2009).

2.3 Assessment of basic reading and math

Regarding math, we conducted written math tests for the students who were in grade 3 in the 2020-2021 school year in the end-line and follow-up surveys.¹⁴ The items covered numbers and basic four operations, including the items posed in text. In the end-line survey, the math test was composed of 44 items, including the sections of number recognition (two items), single-digit addition (eight items), single-digit subtraction (eight items), two-digit addition (four items), two-digit subtraction (four items), single digit multiplication (four items), two-digit multiplication (six items), division (four items), and items posed in text (four items). In the follow-up survey, the same type of math test was prepared with different numbers and texts except for the 11 common items. We also added two items to the division section (six items in total for the section) and two items for items posed in the text (six items in total for the section). We estimated the math scores in numbers and four basic operations, using the item response theory. The math scores in the follow-up survey are equated to the scores in the end-line survey.

The surveys also measured student basic reading, using the Annual Status of Education Report (ASER) tool. The basic reading assessment tool was locally adapted for the local language, Malagasy. Through the individual interviews using the tool, surveyors evaluated student basic reading by five levels: 1) cannot read letters (beginner level); 2) can read letters but cannot read words (letter level); 3) can read words but cannot read paragraph (word level); 4) can read paragraph but cannot read a story (paragraph level); and 5) can read a story (story level).

2.4 Estimation Strategy

The package of interventions for primary schools, PMAQ-TaRL, comprised two components: school management and pedagogy components. The package mainly aimed to realize extra-curricular remedial activities using TaRL. The public education forum was organized to enhance the collaboration among different actors in the region to improve the foundational skills of children. We describe the causal pathways of the interventions on the learning

¹³ The repetition rate in the 2020-2021 school year was 32.2 percent on the Amoron'i Mania side and 33.2 percent on the Haute Matsiatra side. In the following school year, the repetition rate was 44.7 percent on the Amoron'i Mania side and 52.4 percent on the Haute Matsiatra side. When we checked the difference in differences in the repetition rates, the value was not statistically significant.

¹⁴ The duration of the math test was for one hour in both surveys. The math test was conducted in a classroom. The school principal and teachers remained outside classrooms during the test.

outcomes and map the parameters in our estimation strategy. A series of the interventions are modelled as,

$$Y_{ir} = \alpha_0 + \alpha_{1r} SMC_s + \alpha_{2r} Ped_s + \alpha_{3r} (SMC_s \times Ped_s) + \alpha_{4r} (SMC_s \times Ped_s \times Forum_s) + \alpha_{5r} I_r + u_{ir} \quad (1),$$

where Y_{ir} represents the learning outcomes of student i on numbers and the four basic operations at the survey round r (end-line: 1, or follow-up: 2). SMC_s takes the value one for school s which received the school management component of PMAQ-TaRL. Similarly, Ped_s is the dummy for school s that received the pedagogy component (TaRL training), and $Forum_s$ takes the value one for school s in the region where the public education forum was organized.

While the coefficients α_{1r} and α_{2r} indicate the direct effects of the school management and pedagogy components respectively, the coefficient α_{3r} represents the multiplier effect of the two components on the quantity and quality of the extra-curricular remedial activities. The coefficient α_{4r} also indicates the additional effect of the public education forum on the quantity and quality of the remedial activities. I_r is the indicator variable which takes the value one for the follow-up survey. The coefficient α_{5r} indicates the change in the learning outcomes over time and u_{ir} is the error term.

Regarding the math, the difference-in-differences (DD) of the end-line and follow-up surveys is described as $[\alpha_{2,r=2} + \alpha_{3,r=2} + \alpha_{4,r=2}]$, when we assume the equality of $E(\alpha_{1,r=2})$ and $E(\alpha_{5,r=2})$ between the two sides. The DD represents the impact of the TaRL training plus the public education forum for Amoron'i Mania, provided upon the school management component.

The identification of the causal impact using DD requires the parallel trends assumption for the two sides, i.e., the non-heterogeneity of $\alpha_{5,r=2}$ by region in the description of equation (1). As the past scores of math tests are not available, we referred to the educational statistics for the sampled schools to check the trends since the 2018-2019 school year. Columns (X) and (XI) in Table 1 report DD in educational statistics for the surveyed schools in the two sides. None of the values are statistically significant, and the values are small compared with the levels of educational indicators, which supports the parallel trends in the two groups. In Madagascar, as students repeat the same grade if they do not pass the exam at the end of the school year (JICA and IDCJ 2015), the repetition rate is a proxy for student learning levels. The trends in the repetition rates across grades 1 through 4 are similar for the two sides from the 2018-2019 to 2020-2021 school years. The trends in the indicators for the student learning environment, such as the pupil-teacher ratio and ratio of multi-grade classes, are also similar.

Table 1: Trends in educational statistics for the surveyed schools

	2018-2019 school year			2019-2020 school year			2020-2021 school year			(X):	(XI):
	(I) AM	(II) HM	(III): (I)–(II)	(IV) AM	(V) HM	(VI): (IV)–(V)	(VII) AM	(VIII) HM	(IX): (VII)–(VIII)	(VI)–(III)	(IX)–(VI)
(a) Ratio of female students											
Grade 1	0.476	0.506	-0.029	0.475	0.510	-0.034	0.473	0.494	-0.022	-0.005	0.013
Grade 2	0.516	0.497	0.019	0.498	0.517	-0.018	0.488	0.530	-0.042	-0.037	-0.023
Grade 3	0.537	0.493	0.044	0.499	0.496	0.003	0.521	0.501	0.020	-0.041	0.017
Grade 4	0.548	0.545	0.003	0.512	0.516	-0.004	0.496	0.490	0.006	-0.007	0.009
(b) Ratio of repeated students											
Grade 1	0.367	0.340	0.027	0.331	0.331	-0.001	0.318	0.331	-0.012	-0.028	-0.011
Grade 2	0.307	0.334	-0.028	0.303	0.316	-0.013	0.344	0.341	0.003	0.015	0.015
Grade 3	0.346	0.368	-0.022	0.307	0.291	0.016	0.296	0.335	-0.039	0.038	-0.055
Grade 4	0.246	0.251	-0.005	0.233	0.252	-0.019	0.249	0.261	-0.012	-0.014	0.007
(c) Ratio of grade 5 students who passed primary certificate exam	0.352	0.394	-0.043	0.279	0.312	-0.033				0.009	
(d) Ratio of schools with multi-grade classes											
Grade 1	0.446	0.338	0.108	0.446	0.308	0.138	0.431	0.385	0.046	0.031	-0.092
Grade 2	0.492	0.369	0.123	0.538	0.400	0.138	0.462	0.431	0.031	0.016	-0.108
Grade 3	0.200	0.292	-0.092	0.262	0.369	-0.108	0.231	0.308	-0.077	-0.015	0.031
Grade 4	0.492	0.446	0.046	0.523	0.585	-0.062	0.600	0.538	0.062	-0.108	0.123
(e) Student-textbook (Malagasy) ratio											
Grade 1	0.883	0.684	0.199	0.840	0.652	0.189	0.731	0.766	-0.035	-0.010	-0.224
Grade 2	0.791	0.688	0.103	0.777	0.644	0.133	0.634	0.562	0.073	0.029	-0.060
Grade 3	1.146	0.735	0.411	1.007	0.622	0.385	0.796	0.635	0.162	-0.025	-0.224
Grade 4	1.179	0.939	0.240	1.067	0.850	0.217	0.784	0.618	0.167	-0.022	-0.051
(f) Pupil-teacher ratio	35.487	40.951	-5.463	34.453	41.095	-6.642	39.354	47.776	-8.422	-1.179	-1.779
(g) Ratio of regular teachers	0.076	0.085	-0.009	0.042	0.064	-0.022	0.060	0.056	0.005	-0.013	0.027
(h) Ratio of contract teachers	0.335	0.373	-0.038	0.325	0.357	-0.032	0.337	0.396	-0.059	0.007	-0.028
(i) Ratio of locally hired non-regular teachers	0.590	0.542	0.047	0.633	0.580	0.054	0.602	0.548	0.054	0.006	0.001
(j) Number of years of experience of teachers	10.324	9.971	0.353	8.737	9.750	-1.013	9.328	9.845	-0.517	-1.367	0.496
Number of schools	65	65		65	65		65	65			

Note: AM: Amoron'i Mania side. HM: Haute Matsiatra side. Data source is statistics of the Ministry of Education in Madagascar. The educational statistics represent the situation in the school one month after the beginning of the school year. Columns (III), (VI), and (IX) report the difference in the educational statistics in each school year. Columns (X) and (XI) report the difference in differences between the two groups and the test results. Robust standard errors are used. * p<0.1, ** p<0.05, *** p<0.01.

We also checked the implementation status of the math curriculum in the 2020-2021 and 2021-2022 school years using questionnaire survey with school principals. The results are shown in Table A2 in Appendix 3. The progress of math teaching was similar for both sides in the 2020-2021 school year, and almost all the schools covered the contents of numbers and the four basic operations in the following school year. During the 2020-2021 school year, all the schools were temporarily closed due to the increase in COVID-19 cases. The average number of days for the temporary closure of schools was similar between the two sides (40.2 days for Amoron'i Mania and 41.3 days for Haute Matsiatra). During the following school year, part of the surveyed schools was also closed on both sides. While the percentage of schools closed during the 2021-2022 school year was higher on the Amoron'i Mania side than the Haute Matsiatra side, the number of school closed days was limited (8.6 days for Amoron'i Mania and 9.1 days for Haute Matsiatra on average).

The identification of the causal impact, $[\alpha_{2,r=2} + \alpha_{3,r=2} + \alpha_{4,r=2}]$, using DD also supposes the non-heterogeneity of $\alpha_{1,r=2}$ by region in the description of equation (1). As noted in section 2.1, the interventions began to be provided for Amoron'i Mania from the 2019-2020 school year and for Haute Matsiatra from the 2020-2021 school year. While the percentage of the schools that organized supplementary classes was small on both sides in the 2018-2019 school year, it increased with the progress of the interventions (Table 2). In the 2021-2022 school year, almost all the schools organized supplementary classes on both sides.

Table 2: Comparison on the organization of supplementary classes by school year

	2018-2019			2019-2020			2020-2021			2021-2022		
	AM (I)	HM (II)	Diff. (III)	AM (IV)	HM (V)	Diff. (VI)	AM (VII)	HM (VIII)	Diff. (IX)	AM (X)	HM (XI)	Diff. (XII)
For Grade 2	3.1	3.1	0.0	26.2	1.6	24.6***	100	38.5	61.5***	98.5	96.9	1.5
For Grade 3	3.2	1.6	1.7	28.1	1.6	26.6***	96.9	40	56.9***	98.5	96.9	1.5
For Grade 4	3.3	3.5	-0.1	27.9	1.7	25.9***	100	41.0	59.0***	98.4	96.8	1.6

Note: AM: Amoron'i Mania side. HM: Haute Matsiatra side. The data source is the baseline and end-line survey of this study. Columns (III), (VI), (IX), and (XII) report the difference between the two sides and the test results for the difference in means. Robust standard errors are used. *** p<0.01.

In our empirical strategy, we estimate the following equation, using the panel data from two rounds of survey (end-line and follow-up).

$$Y_{ir} = \alpha_i + \gamma \text{Post}_r + \delta (\text{AM}_s \cdot \text{Post}_r) + \varepsilon_{ir} \quad (2).$$

In equation (2), Y_{ir} takes the math scores in numbers and basic four operations which are

estimated using the item response theory. The math scores are standardized using the mean and standard deviations in the end-line survey. $Post_r$ is a dummy variable which takes the value one for the post-treatment period (follow-up). AM_s is also a dummy which takes the value one for the schools on the Amoron'i Mania side. In equation (2), α_i represents the student fixed effects, and ε_{ir} is the error term. Robust standard errors clustered at the school level are used. The coefficient of our interest is δ .

While we report the math results as our primary analysis in the following section, we also analyze the basic reading results as the secondary outcome. Specifically, we estimate equation (2), taking the basic reading level dummy as the dependent variable, using the panel data from two rounds of survey (baseline and follow-up). As the Haute Matsiatra side received the interventions related to basic reading one school year after compared to the Amoron'i Mania side, the DD on basic reading for baseline and follow-up would not be statistically significant when the Haute Matsiatra side caught up with the Amoron'i Mania side.¹⁷

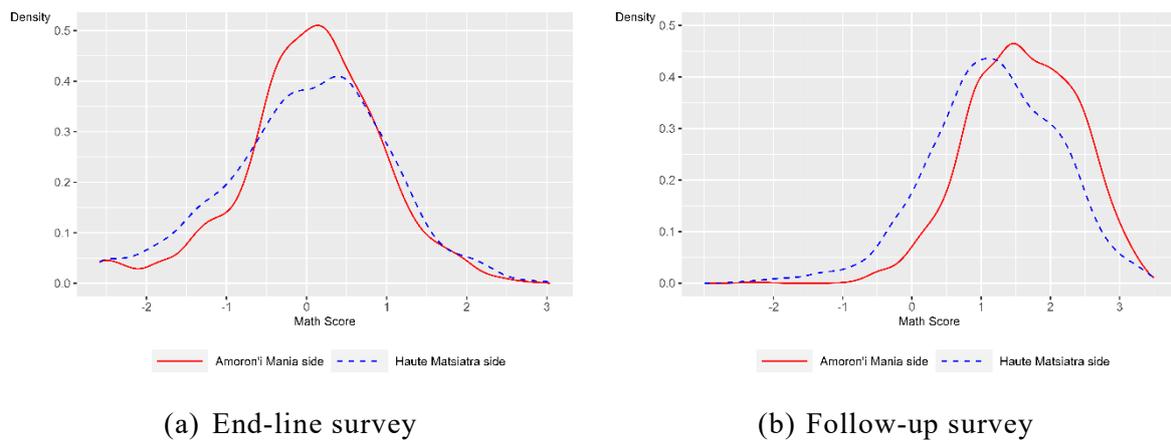
¹⁷ We investigated the impact of the scaled-up interventions for the schools on the Amoron'i Mania side in the 2020-2021 school year in our previous paper (Maruyama and Igei 2023). With the foundation of the improved capacity of the SMCs, the TaRL training increased the proportion of grade 3 and 4 students who could read words written in the local language by 17.7 percentage points and those who could read a story by 5.4 percentage points in Amoron'i Mania.

3. Results

3.1 Learning outcomes in math (numbers and the four basic operations)

The distributions of the scores in the end-line to the follow-up surveys are shown in Figure 4. The improvement in the math scores was larger in Amoron'i Mania than in Haute Matsiatra. The regression results on the impact on math scores are presented in Table 3. The TaRL training plus the public education forum improved learning outcomes in numbers and four basic operations by 0.37 standard deviations (Column (I) in Table 3). As the sample attrition rate was larger on the Haute Matsiatra side compared to the Amoron'i Mania side, we estimated the lee bounds of the impact (Lee 2009). The lower bound of the impact is estimated at 0.32 standard deviations (Column (II)). As we equated the math scores in the end-line and follow-up surveys using the item response theory, the coefficient γ in equation (2) represents the one-year gain on the Haute Matsiatra side. The magnitude of the impact was approximately a third of the one-year gain.

Figure 4: Density curves of the math scores



Note: This research conducted the end-line survey at the end of the 2020-2021 school year and the follow-up survey at the end of the 2021-2022 school year. The figures include students who were present at the two surveys. The number of students was 1368 (Amoron'i Mania side) and 1566 (Haute Matsiatra side). The math scores were estimated using item response theory and equated between the two survey rounds.

As noted in section 2.3, the math test items comprised different sections of four basic operations. To understand the impact on math scores from different angles, we also estimated equation (2), taking the dummy for students who correctly responded to more than 75 percent of the items for each section of two-digit addition, two-digit subtraction, single-digit

multiplication, two-digit multiplication, and division, as the dependent variable.¹⁸

Table 3: Regression results of the impact on math scores

	All sample (I)	Lower bound (II)	Upper bound (III)
$AM_s \times \text{Post}$	0.370*** (0.096)	0.329*** (0.094)	0.405*** (0.096)
Post	1.157*** (0.077)	1.157*** (0.077)	1.157*** (0.077)
Number of schools	128	128	128
Number of observations	5868	5716	5716

Note: The dependent variable is the math scores estimated using item response theory. The values were standardized with the mean and standard deviation of the scores of the Haute Matsiatra side at the end-line survey. Robust standard errors clustered at the school level are used. * $p < 0.1$, *** $p < 0.01$.

TaRL training plus the public education forum increased the proportion of students who correctly responded to more than 75 percent of items in each section (Table 4). For example, the set of interventions increased the proportion of students by 24 percentage points for two-digit subtraction. Conversely, the magnitude of the impact was smaller for two-digit multiplication. While the correct response rate for the items of multiplying two-digit with single-digit improved, students had difficulty in solving the items of multiplying two-digits with two-digits.

Additionally, we estimated the impact for the math items posed in the text, taking the standardized value of the sub-total as the dependent variable in equation (2). The estimated impact was 0.243 standard deviations (standard error: 0.107, p-value: 0.025). Thus, TaRL training plus the public education forum improved the student's applying skills in numbers and the four basic operations.

¹⁸ The dummy variable takes the value one for students who correctly responded to three out of four items for each section of two-digit addition, two-digit subtraction, single-digit multiplication, and division. Regarding two-digit multiplication, the dummy variable takes the value one for students who correctly responded to five out of six items.

Table 4: Regression results on the impact on math scores (by math item categories)

	Addition (two-digits)	Subtraction (two-digits)	Multiplication (single digit)	Multiplication (two-digits)	Division (w/o remainder)
	All sample (I)	All sample (II)	All sample (III)	All sample (IV)	All sample (V)
AM _s × Post	0.177*** (0.047)	0.240*** (0.046)	0.143*** (0.043)	0.083* (0.048)	0.128*** (0.047)
Post	0.282*** (0.038)	0.231*** (0.030)	0.252*** (0.031)	0.202*** (0.027)	0.292*** (0.032)
Average in HM side (end-line survey)	0.394	0.177	0.453	0.022	0.162
Number of schools	128	128	128	128	128
Number of observations	5868	5868	5868	5868	5868

Note: HM: Haute Matsiatra. The dependent variable is a dummy that takes value 1 for students who correctly responded to more than 75 percent of each section. Robust standard errors clustered at the school level are used. * p<0.1, *** p<0.01.

3.2 Basic reading of local language

As the Amoron'i Mania side received basic reading intervention in the 2020-2021 school year, we can check whether the students maintained their basic reading level from the end-line to the follow-up survey. As shown in Table 5, none of the students on the Amoron'i Mania side lost their basic reading level. The attrition in the student sample on the side from the end-line to the follow-up survey was 67, representing less than five percent of the end-line sample.¹⁹

Figure 5 describes the trends in the proportion of students in basic reading levels on the two sides. From the baseline to the end-line surveys, the increase in the proportion of students in the word level was larger on the Amoron'i Mania side than the Haute Matsiatra side. Conversely, the students on the Haute Matsiatra side improved their basic reading level from the end-line to the follow-up survey. We examined whether students on the Haute Matsiatra side caught up with the Amoron'i Mania side in basic reading using regression analysis. As noted in section 2.4, we estimated equation (2), taking the basic reading level dummy as the dependent variable, by the sub-samples for baseline reading level. While we observe a few differences in the change of the proportion of students in the basic reading level at the follow-up survey, most of the estimates are not statistically significant (Table A3 in Appendix 4). The results show that TaRL training plus the public education forum helped students on the Haute

¹⁹ We regressed the attrition dummy on the variable of basic reading level in the end-line survey, which takes the value from one (beginner) to four (story), and student characteristics, using the sub-sample from Amoron'i Mania. The coefficient of the basic reading level variable was slightly negative (-0.006) but not statistically significant (p-value: 0.19). The percentage of sample attrition by basic reading level in the end-line survey was 3.37 percent (beginner), 6.11 percent (letter), 4.55 percent (word), 3.86 percent (paragraph), and 0 percent (story).

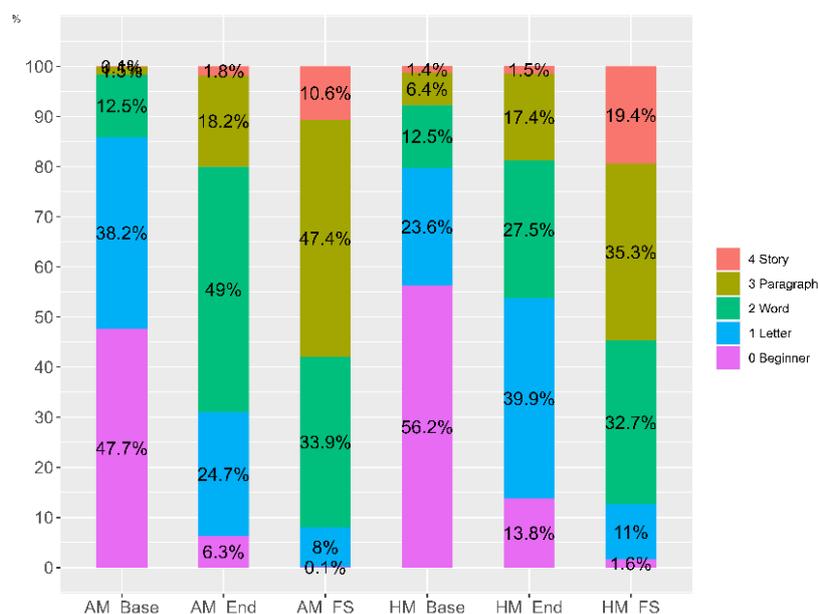
Matsiatra side catch up in their basic reading skills with the Amoron'i Mania side.

Table 5: Cross table of the basic reading levels from the end-line to the follow-up survey on the Amoron'i Mania side

		Follow-up survey				
		Beginner	Letter	Word	Paragraph	Story
End-line survey	Beginner	1	51	26	8	0
	Letter	0	59	229	48	2
	Word	0	0	209	422	40
	Paragraph	0	0	0	170	79
	Story	0	0	0	0	24

Note: This table includes students who were present in all three rounds of survey (baseline, end-line, and follow-up surveys). The number of students was 1368 (Amoron'i Mania region).

Figure 5: Trends in basic reading level from the baseline to follow-up survey



Note: (1) AM: Amoron'i Mania. HM: Haute Matsiatra. Base: baseline survey. End: End-line survey. FS: Follow-up survey. (2) Figure includes students who were present all the three rounds of survey (baseline, end-line, and follow-up surveys). The number of students was 1368 (Amoron'i Mania region) and 1566 (Haute Matsiatra region).

3.3 Robustness check of the estimated impact for math scores

TaRL training (basic reading) plus the public education forum helped students on the Haute Matsiatra side catch up on their basic reading skills. When the improved basic reading skills enhanced the math learning of students on the Haute Matsiatra side, the basic reading skills term should be added to the righthand side in equation (1). In the estimation strategy, the effect of the improved basic reading skills should be controlled; otherwise, the estimate of DD would under-estimate the impact of TaRL training (math) plus the public education forum on math learning outcomes. As the robustness check of the estimated impact for math scores in section 3.3, we estimate the following equation,

$$\Delta Y_i = \delta AM_s + \Delta \dot{L}_i \lambda_1^L + (1 - AM_s) \Delta \dot{L}_i \lambda_2^L + \varepsilon_i \quad (3)$$

where ΔY_i represents the difference of the math scores of the end-line and the follow-up surveys. \dot{L}_i is a vector of the basic reading level dummies for student i subtracted by the means, and $\Delta \dot{L}_i$ takes a vector of the change of the value \dot{L}_i from the end-line to the follow-up survey. The coefficient λ_2^L captures the effect of the improved basic reading skills on math scores for students in Haute Matsiatra region. The estimated value of δ in equation (3) is 0.393 (standard error: 0.068), which is statistically significant at the 1 percent level. The estimated value of δ in equation (3) became slightly larger but remains almost at the same level as the estimated value of δ in equation (2).

4. The process to develop the collective impact to improve foundational learning

According to the monitoring record of the Ministry of Education (2023), approximately 80 percent of the SMCs in Amoron'i Mania and 94 percent of those in Haute Matsiatra developed and implemented school action plans, including the organization of extra-curricular remedial activities. The educational administration conducted training for teachers and community volunteers and provided support for schools to address the agreed objective in the forum (i.e., the improvement of basic reading in Haute Matsiatra and math in Amoron'i Mania). The collaboration between the educational administration and the local community to address a common agenda on foundational learning in the two regions was an example of collective impact.

In the model of collective impact, all the actors set a common agenda to be solved through their coordinated actions (Kania and Kramer 2011). In the follow-up survey, we collected data from 130 schools on the two sides near the regional border that describe the process from the regional forum to the activities at the school level. While the topic of the agenda addressed in the collaboration among different actors differed in the two regions, the agenda was shared in

each region in a similar way. The process mainly comprised the following three steps: (1) decision of the objectives and actions at the regional forum; (2) information-sharing and discussions at the commune and the school levels; and (3) implementation of the activities at the school and the local community level.²⁰ The follow-up survey data related to the process are reported in Table 6.

Table 6: Process of developing collective impact from the survey data for the 130 schools

Indicators related to the activities	AM (I)	HM (II)	Diff. (III): (I)-(II)
First step: Decision of the objectives and actions at the regional forum			
Objective was agreed (Yes or No).	Yes	Yes	N/A
Topic of the decision	Math	Reading	N/A
Second step: Information-sharing and discussions at the commune- and school-level			
Participation rate of SMC to the GA of SMC Federation	81.5%	83.1%	-1.5%
Percent of SMCs which developed school action plan	100%	100%	0%
Percent of SMCs which organized CGA to develop school action plan	98.5%	100%	-1.5%
Third step: implementation of activities at the school and local community level			
Percent of SMCs which implemented extra-curricular remedial activities (for grade 4 students)	98.4%	96.8%	1.6%
Participation rate of teachers by school in the remedial activities	91.3%	83.1%	8.2%*
Average number of community volunteers	0.83	0.77	0.06
Average volume of extra-curricular remedial activities	59.7 hours	78.2 hours	-18.6 hours***
Percent of schools that received support from ZAP leader	49.2%	61.5%	-12.3%
Percent of schools that received support from SMC federations	7.7%	13.8%	-6.2%

Note: AM: Amoron'i Mania. HM: Haute Matsiatra. GA: General Assembly. CGA: Community General Assembly. Columns (III) reports the mean difference for the two sides and the test results. Robust standard errors are used. * $p < 0.1$, *** $p < 0.01$.

The agreed objectives in the forums were shared stepwise among local actors on the two sides. After the regional forum, all the SMC federations in the surveyed communes organized the general assembly of member SMCs (Ministry of Education 2023). More than 80 percent of the surveyed SMCs on both sides participated in the general assembly, where the agreed objectives of the forum were shared and discussed (Table 6). Based on the discussions at the SMC federation general assembly, almost all the SMCs organized a community general assembly at their schools to share and discuss topics related to the agreed objectives in the forum. School action plans were developed through information-sharing and discussions in the assembly, and more than 90 percent of SMCs organized extra-curricular remedial activities addressing the

²⁰ The process is called the “forum approach” (Kunieda et al. 2020). Maruyama et al. (2022) studied the case of collective impact to expand the enrollment of girls in Niger in which the forum approach was employed.

agreed objectives in the forum on both sides.

Regarding the development and implementation of the school action plan, around half of the SMCs received support from ZAP leaders on both sides. ZAP leaders provided technical advice for SMCs on the development of school action plans, the organization of remedial activities, and resource management. A part of the schools also received a support from the SMC federations, including advice on how to sensitize parents.

5. Conclusions

To address the severe learning crisis in Madagascar after the school closure due to the COVID-19 pandemic, the Ministry of Education began scaling-up training on the pedagogical approach of numeracy skills, called “Teaching at the Right Level (TaRL),” for primary teachers and community volunteers. This training was part of a package of interventions that aimed to strengthen the capacity of the school management committee (SMC) to lead extra-curricular remedial activities. In parallel with the process of scaling up the package for primary schools, the Ministry organized the public education forum to develop collaboration among different actors to improve foundational skills in a region.

This study investigated the impact of the scaled-up interventions on foundational learning, targeting two neighboring regions in the south-central highlands of Madagascar, Amoron'i Mania and Haute Matsiatra. The Ministry of Education scaled up the interventions for the two regions stepwise but on different timelines. Amoroni Mania region received interventions one school year earlier than Haute Matsiatra. We used this setting to investigate the impact of the scaled-up interventions for primary students, employing a difference-in-differences strategy. The TaRL training plus the public education forum improved learning outcomes in numbers and four basic operations by 0.37 standard deviations.

The cases in the two regions suggest that it is possible to reproduce the collective impact to address learning crisis in other regions or countries, following the intervention strategy employed in the two regions studied. The process included the following three steps: (1) decision of the objectives and actions at the regional forum; (2) information-sharing and discussions on the agreed objectives at the commune and the school levels; and (3) implementation of activities at the school and local community level to address the agreed objectives. In Amoron'i Mania, a series of training of the school management component was provided for primary schools in the 2019-2020 school year. The survey data on the school action plan obtained in this study indicates that the functionality of SMCs sustained after one and a half years of training. The functionality of SMCs to develop school action plans was the

foundation to develop collective impact in the regions.

Appendix 1: Attrition analysis

Appendix 2: Situation of basic reading learning in Haute Matsiatra in 2021 and 2022 (Grade 3 and 4 students)

Appendix 3: Implemented math curriculum in the 2020-2021 and 2021-2022 school years

Appendix 4: The regression results of the impacts

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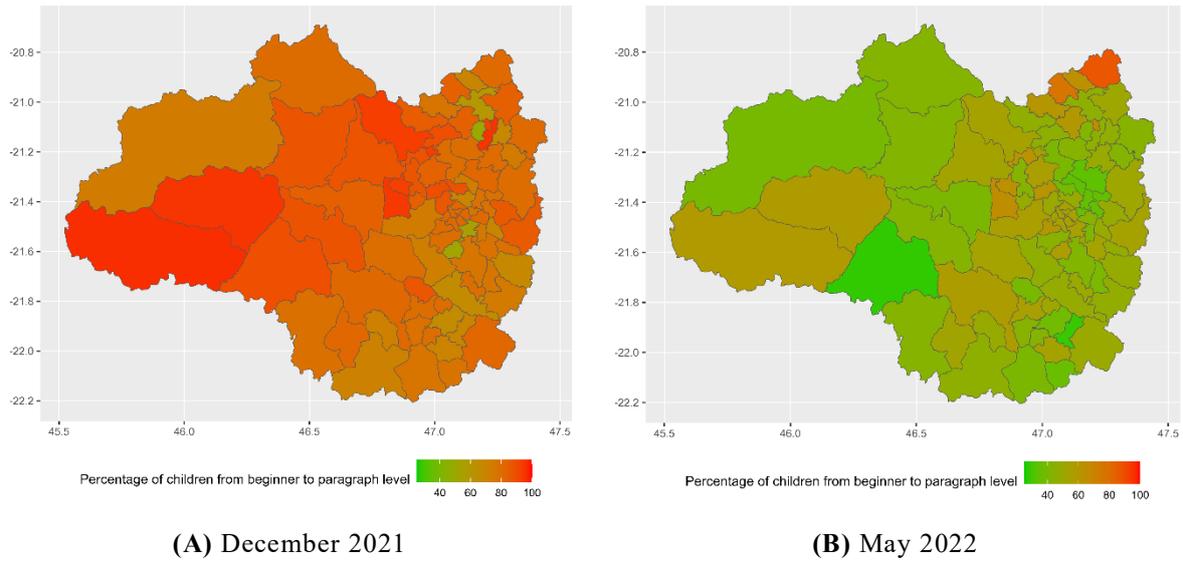
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Table A1: Attrition analysis

	(I)	(II)	(III)
Intercept	0.001 (0.050)	0.016 (0.045)	0.004 (0.051)
Amaron'i Mania	-0.038*** (0.019)	-0.037** (0.019)	-0.038** (0.019)
Basic reading level (beginner)	0.012 (0.040)		0.009 (0.044)
Basic reading level (letter)	0.016 (0.037)		0.014 (0.040)
Basic reading level (word)	0.021 (0.051)		0.019 (0.054)
Basic reading level (paragraph)	0.010 (0.054)		0.009 (0.055)
Math scores at the end-line survey		-0.002 (0.006)	-0.003 (0.006)
Age	0.007* (0.004)	0.007* (0.004)	0.007* (0.004)
Sex	-0.005 (0.010)	-0.005 (0.010)	-0.005 (0.010)
Computer	-0.062*** (0.019)	-0.063*** (0.018)	-0.063*** (0.019)
TV	-0.010 (0.017)	-0.010 (0.017)	-0.010 (0.017)
Radio	0.015 (0.011)	0.015 (0.010)	0.015 (0.011)
Smartphone	0.045 (0.048)	0.044 (0.048)	0.045 (0.048)
Cell phone	0.003 (0.011)	0.003 (0.010)	0.003 (0.011)
Malagasy book	-0.024 (0.015)	-0.024 (0.016)	-0.024 (0.016)
Family taught Malagasy	0.014 (0.015)	0.014 (0.014)	0.014 (0.015)
Repeated	0.016 (0.013)	0.016 (0.013)	0.016 (0.013)
Preschool	-0.014 (0.012)	-0.014 (0.012)	-0.014 (0.012)
Number of schools		129	129
Number of observations		3157	3157

Note: The dependent variable is the student attrition dummy. Robust standard errors clustered at the school level are used. The student characteristics and basic reading assessment results are from the baseline survey conducted in October 2020. The math scores are from the end-line survey conducted in June 2021. * p<0.1, ** p<0.05, *** p<0.01.

Figure A1: Situation of basic reading learning in Haute Matsiatra in 2021 and 2022
(Grade 3 and 4 students)



Note: (1) The figures included the students from grade 2 through 5. The number of students in the figures was 133392 (A) and 135644 (B) at the 1139 schools. (2) Data source: TaFita project.

Table A2: Implemented math curriculum in the 2020-2021 and 2021-2022 school years

	AM side (I)	HM side (II)	Difference (I)-(II)
Situation of school closure in the 2020-2021 school year			
Number of school closed days	40.2	41.3	-1.06
Number of schools	65	65	
Percentage of schools which have taught the following items for grade 3 students in the 2020-2021 school year			
Two-digit addition without carrying	100.0	100.0	0
Two-digit addition with carrying	90.6	96.9	-6.3
Two-digit subtraction without borrowing	96.9	98.5	-1.6
Two-digit subtraction with borrowing	87.5	90.8	-3.3
Multiplication (one-digit by one-digit)	96.9	93.8	3.0
Multiplication (two-digit by one-digit)	87.5	90.8	-3.3
Multiplication (two-digit by two-digit)	59.4	43.1	16.3*
Division (one-digit by one-digit) without remaining	81.3	86.2	-4.9
Division (two-digit by one-digit) without remaining	59.4	53.8	5.5
Number of schools	64	65	
Situation of school closure for grade 4 students in the 2021-2022 school year			
Percent of schools closed due to COVID-19	35.9	23.8	12.1
Number of days closed for the schools	8.65	9.13	-0.48
Number of schools	64	63	
Percentage of schools which have taught the following items for grade 4 students in the 2021-2022 school year			
Two-digit addition without carrying	100.0	100.0	0
Two-digit addition with carrying	100.0	100.0	0
Two-digit subtraction without borrowing	100.0	100.0	0
Two-digit subtraction with borrowing	100.0	100.0	0
Multiplication (two-digit by one-digit)	98.4	100.0	-1.6
Multiplication (two-digit by two-digit)	98.4	100.0	-1.6
Division (one-digit by one-digit) without remaining	98.4	100.0	-1.6
Division (two-digit by one-digit) without remaining	93.8	100.0	-6.3**
Division (two-digit by one-digit) with remaining	93.8	96.8	-3.1
Number of schools	64	63	

Note: The data is from the interview with school principals in the end-line and follow-up surveys. The surveyors asked school principals whether their teachers had already taught each content for students or not.

Table A3 : Regression results on basic reading levels

	Beginner (I)	Letter (II)	Word (III)	Para (IV)	Story (V)
Baseline: Beginner					
AM _s ×Post	-0.027 (0.017)	-0.034 (0.056)	0.022 (0.047)	0.079 (0.057)	-0.040 (0.030)
Post	-0.972*** (0.017)	0.183*** (0.044)	0.433*** (0.036)	0.285*** (0.048)	0.070** (0.028)
Number of observations	3066	3066	3066	3066	3066
Baseline: Letter					
AM _s ×Post		-0.005 (0.017)	0.065 (0.077)	0.139 (0.088)	-0.199** (0.085)
Post		-0.970*** (0.012)	0.198*** (0.051)	0.461*** (0.062)	0.312*** (0.081)
Number of observations		1782	1782	1782	1782
Baseline: Word					
AM _s ×Post			-0.025 (0.090)	0.046 (0.101)	-0.022 (0.143)
Post			-0.800*** (0.080)	0.497*** (0.079)	0.303 (0.120)
Number of observations			732	732	732
Baseline: Paragraph					
AM _s ×Post _{t=2}			-0.190* (0.096)	-0.150 (0.192)	0.340 (0.239)
Post			0.190 (0.096)	-0.650*** (0.118)	0.460** (0.185)
Number of observations			240	240	240

Note: The dependent variable is a binary variable for each reading level. Panel data from the baseline and follow-up surveys is used. Student fixed effects are controlled in all regressions. Robust standard errors clustered at the school level are used. * p<0.1, ** p<0.05, *** p<0.01.

Abstract (in Japanese)**要 約**

サブサハラアフリカ地域において、新型コロナの感染拡大に伴う学校閉鎖が解かれた後、子ども達の数と計算等における基礎的スキルの改善は重点政策課題となっている。マダガスカルにおいて、同国教育省は、“Teaching at the Right Level (TaRL)” と呼ばれる、数と計算における基礎的スキルにかかる教授法の研修を初等教員及び地域ボランティアに対して実施した。TaRL 研修は、学校運営委員会が同手法を用いて放課後の補習活動を実施するために開発された介入パッケージの一部である。TaRL 研修の実施に並行し、マダガスカル教育省は、子ども達の基礎的スキルの改善に向けて教育行政や地方自治体等の多様なアクター間の協力を強化するため、県教育フォーラムを開催した。本研究では、これらの介入が学校年度毎に対象県を徐々に拡大する形でスケールアップされていった点に着目し、差分の差法を用い、小学生児童の学習に対する介入効果を推定する。具体的には、社会文化的背景の類似した隣り合う県を対象とし、それら県間の境界付近に位置する市の小学校を対象として調査を実施した。TaRL 研修と県教育フォーラムの実施により、子ども達の数と計算にかかる学習成果は平均して 0.37 標準偏差、改善した。マダガスカルにおける本事例は、学習の危機に対し、子ども達の基礎的スキルを改善するためのコレクティブ・インパクト（社会課題の解決のための多様なアクター間の協力）を形成することが可能であることを示している。

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