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Enlightening Communities and Parents for Improving Student Learning Evidence from Randomized Experiment in Niger[*]

Eiji Kozuka[†]

Abstract

Providing local communities with authority to manage school resources is a popular education policy in the developing world. However, recent studies suggest that this type of intervention has limited impact on student learning outcomes. To investigate how communities can effectively utilize school resources, we conducted a randomized experiment in Niger by providing school grants and training for school committees to increase communities' awareness of student learning and improve resource management. The result shows that, when the training was conducted with grant provision, communities increased activities that enhanced student effort, and student test scores in math and French remarkably improved, particularly for low-performing children. As a secondary effect of the training, parents, who have realized their children are not learning the basics at school, increased their contribution to school committees and their support for children's home study. These results suggest that sharing information and knowledge with communities and raising their awareness is a key to enhancing effectiveness of community participation and school grants policy.

Keywords: Education, Decentralization, Accountability, Field experiments

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1. Introduction

Improving student learning is an imperative challenge for the developing world. While primary school enrollment has considerably improved in the last two decades, more than 250 million children in the world are not learning basic literacy and numeracy skills, whether they go to school or not (UNESCO 2014). During this period, a number of developing countries have adopted a policy to decentralize authority in school management from the government to the school-level agents including local communities and parents. Providing school grants is an intervention often implemented under this initiative[1], where school committees and local communities are given power to manage the grants. This decentralization policy is expected to improve educational outcomes and parental satisfaction since it gives a voice and power to local stakeholders who know more the need on the ground than central-level agents (Barrera-Osorio et al. 2009; Bruns, Filmer and Patrinos 2011).

This paper examines how schools and communities can manage school grants for improving student learning in Niger. To evaluate the intervention, we conducted a large field experiment in collaboration with a program called "Ecole pour Tous (EPT)," or "School for All" project. EPT is a program in education that involves the participation of the community, which has been jointly implemented by Niger's Federal Ministry of Education and Japan International Cooperation Agency (JICA) since 2004, originally aiming at making school committees function effectively. In the EPT's initial model, school committee members are selected by a secret ballot election, in which any adult residents within the school district can participate. Through the committee's facilitation, the community and school work together to develop and implement an annual school improvement plan using the community's own resources. While this model has been successful in enhancing community participation and improving access to

[1] Another important policy implemented in this period is fee-free education. In many countries, school grants were introduced to make up for the funds that were previously collected from parents (Lugaz and Grauwe 2016).

primary education, and has been expanded into neighboring countries such as Senegal, Burkina Faso, Mali, and Côte d'Ivoire, there was still space for further refinement to improve the quality of education.

In our experiment, EPT introduced two additional interventions into the initial model: school grants and training for effective resource management to improve learning. In this training, school committee members learn how to make and implement an effective school action plan. After the training, school principals conduct a student exam and summarize the results for communities to be able to understand it. In the next step, school committees organize a community assembly to present the results of the exam and identify what challenges schools are facing and how communities can work with schools to improve student learning. To evaluate the effectiveness of these interventions, we assigned 180 schools into three groups randomly. The first school received school grants only (Grants-only group), the second group had resource management training as well as school grants (Grants-plus-Training group), and the third group received neither as a control group. After two years from the intervention, we found that the Grants-plus-Training schools performed better in math and French exams than the comparison and Grants-only schools. While the treatment effect of the Grants-only group was small (or even negative) and insignificant, the average effect of the Grants-plus-Training group was 0.41 standard deviations in math and 0.28 standard deviations in French. Our analysis suggests that the resource management training is highly cost-effective, compared to other learning interventions.

In both the Grants-only and the Grants-plus-Training group, grants were utilized to purchase textbooks, teacher’s guides, and school supplies, but these inputs alone may not have been enough to improve student performance. Differences between the Grants-only and the Grants-plus-Training schools were found in after-class studies. A lot of Grants-plus-Training students attended remedial classes and night classes which were supported by school committees. Students of the Grants-plus-Training schools also did more home study, which were often

supported by their older brothers and sisters. These results suggest that the training induced school committees and communities to allocate more resources for activities that are effective in student learning and that providing information on children's performance motivated parents to encourage their children to study at home.

Looking at the results by student initial learning level, the effect of the resource management training is stronger for lower-performing children than for higher-performing children. This heterogeneous impact is explained by the increase in the children's own and families' efforts: the training induced weaker students to participate in after-class study sessions and to study more at home, and encouraged their families to support home studies.

This study contributes to the literature on three types of education policy popular in the developing world: community participation in education (or school-based management), increasing school inputs, and information provision. The result is consistent with recent studies on the effectiveness of school grants and the other types of school inputs: many studies show that, while school inputs can often improve some educational outcomes such as enrollment, inputs alone have little impact on student learning (Glewwe et al. 2004; Glewwe, Kremer, and Moulin 2009; Pradhan et al. 2014; Blimpo, Evans and Lahire 2015; Beasley and Huillery 2016). Some reviews even conclude that providing school grants is one of the least effective interventions to improve student test scores (McEwan 2015; Evans and Popova 2016).

An important reason behind the limited impact of the school grants is that they are not spent effectively due to the low capacity of community members who are responsible for managing the grants. In Niger, Beasley and Huillery (2016) provide evidence that the grants are utilized for items that do not lead to improving student performance, such as school infrastructure and investment in an agricultural project. In Gambia, Blimpo, Evans and Lahire (2015) have found that school grants with school management training improved student performance in villages with high literacy, but it had even negative results in low literacy villages. In Mexico, Gertler, Patrinos, and Rubio-Codina (2012) also show that grants and

training had no impact in extremely poor communities, where parents may lack capacity to voice their needs. Another possible reason is that parents reduce involvement in their children's education in response to increased school resources. In the United States, Houtenville and Conway (2008) find negative correlation between school resources and parental behavior such as discussing with children and attending school meetings, suggesting that school resources decrease parental effort for their children's education. In India and Zambia, Das et al. (2013) find that, when schools were given surprise grants, the children's test scores did improve, but when parents anticipated that the grants would come, they decreased household spending in education, and their children's test scores did not improve.

In many developing countries, where parents have little schooling, how can communities and parents manage the school grants to improve student learning? This study gives an answer to this question and explores a mechanism that makes community participation work.

Among various types of education intervention, the resource management training in our experiment can fall into the category of information intervention, particularly the one that provides community and parents with information on student performance. There are mixed evidence on the effectiveness of this type of intervention. For example, in India, Banerjee, Banerji, Duflo, Glennerster, and Khemani (2010) find that sharing children's literacy test scores with parents, community members, and teachers at village-wide meetings had no impact. Likewise, in Kenya, Lieberman, Posner, and Tsai (2014) show that providing parents with information on their children's performance had no impact on parental behavior. Meanwhile, in Pakistan, Andrabi, Das, and Khwaja (2015) find that providing report cards to parents and schools improved test scores. In Mexico, de Hoyos et al. (2017) show that dissemination of students' performance information and diagnostic feedback led to improvement in test scores.

As suggested by these studies and recent reviews such as Mbiti (2016) and Read and Atinc (2017), providing information alone is not enough to improve student learning outcomes,

but when parents are given avenue to affect the education system, information can play an important role for the improvement. In Niger, our experimental intervention was built into an existing school-based management policy, which can make information intervention work effectively through active community participation, and therefore produced large impacts.

This study will further understanding in this area by investigating how parents and communities respond to information about student performance. This paper is unique in that it examined the effect on both school and home learning environments, while most of related researches in developing countries have paid keen attention to the effect on the school side, and analyzed how information can strengthen school accountability. As a representative study on this issue, Bruns, Filmer, and Patrinos (2011) argue that information can affect learning outcomes through increasing parents' school choice, oversight of school teachers, and voice to promote better policies. In addition to this aspect, this paper examines how information intervention can increase communities' willingness to support school and to increase parental effort to improve home learning environment. While there are several studies on the impact of information provision on parent and student effort,[2] few analyze it in the framework of community participation.

The rest of this paper is organized as follows: The next section describes the program and the data collection for the evaluation. Section III explains the evaluation methodology and section IV presents the impact of the program on student learning outcomes and critical factors that can affect student learning such as school committees' activities, student efforts, and parental efforts. The final section makes a conclusion.

[2] For example, in the United States, Bergman (2015) shows that providing information on children's missed assignments and grades increased parent and student effort and improved student learning outcomes. In Chile, Berlinski et al. (2016) show that providing parents with information on student outcomes by text message improved student effort and learning outcomes.

2. The Context and Experimental Design

Since early 2000, Niger has made remarkable progress in access to primary education. Between 2000 and 2015, the net primary enrollment ratio increased from 27 percent to 62 percent (UNESCO Institute for Statistics 2017). An education initiative implemented during this period was establishing new school committees, called Comité de Gestion de l'Ecoles, or COGES. To make school committees function effectively, several measures were introduced in this effort. First, to gain wide support from communities, school committee members were selected by election at the community assembly[3]. Second, communities were deeply involved in making school committees' annual plan for improving school environment such as constructing and repairing classrooms, providing desks and chairs, constructing water facilities, and purchasing learning materials for students. In the assembly held in the early school year, parents, local residents, school teachers, and students gathered to share information about challenges schools are facing, and activities that communities can help in to solve the problems. Based on the discussions, school committees made an annual school improvement plan, and communities approved the plan in the next assembly. Third, in the original school committee model, the annual plan was implemented with locally mobilized resources. At the end of the school year, communities reviewed the results of the implementation of the plan (Hara 2011). This initiative had been successfully scaled up in Niger until 2008 with assistance from JICA and the World Bank (Honda and Kato 2013), and a similar school committee model has been adopted by the governments of other Francophone countries such as Senegal, Burkina Faso, Mali, and Cote d'Ivoire, and is being scaled-up. A recent randomized evaluation in Burkina Faso has shown that the program improved educational outcomes such as student enrollment and repetition (Kozuka,

[3] More precisely, six representatives of the parents' association are elected by secret ballot at the community assembly, and three of them become the school committee members. The other committee members are a representative of the mothers' association, the school principal, a representative of school teachers and a representative of students.

Sawada, and Todo 2016) and enhanced social capital among school and community members (Sawada et al. 2016; Todo, Kozuka, and Sawada 2016).

While this school committee policy has made significant contribution to the progress in Niger's education, the country is still facing huge challenges in the quality of education. The completion rate of primary school is 49 percent, and more seriously, only three percent of children complete primary school with sufficient competency in math and science (PASEC 2015).

To resolve the situation, Niger's Federal Ministry of National Education and JICA conducted experimental interventions using school grants and training for school committees to utilize the additional resources effectively. The experiment was implemented in the Say and Torodi districts of the Tillabery region from December 2012 to May 2014. From 328 primary schools that existed in the two districts in 2012, we selected 60 schools for the comparison group, 60 schools for the Grants-only group, and 60 schools for the Grants-plus-Training group. To reduce imbalance across groups, we created strata in terms of educational administrative region (four regions in Say and three regions in Torodi) and school scale (large-scale or small-scale).

Before the experiment started, school committees already existed and were conducting activities explained above in all the 180 schools including the comparison group. For the experimental interventions, EPT first conducted financial training for both the Grants-only group and Grants-plus-Training group to ensure appropriate management of the school grants. After the financial training, EPT conducted resource management training for the Grants-plus-Training group only. In this resource management training, school committee members learn how to facilitate a community meeting to provide information on student performance and make an effective plan for improving student learning, and are given knowledge about important factors for learning, such as classroom hours, school infrastructure and learning materials, and the quality of teaching and learning. After this training, schools conduct a student exam in math and French and summarize the results. In the next step,

committees organize a community assembly to induce communities to be aware of the importance of learning and explain the exam results. Even before the intervention, schools already had practice providing parents with test score cards, but many parents did not understand the numbers written on the card or even did not know the existence of the score cards. EPT therefore utilizes the community assembly to enable parents and communities to better understand the real situation of student learning. Then, school committees facilitate discussion on what communities can do with school grants and their own resources. Based on the result of this discussion, school committees make a school improvement plan, and organize the second community assembly to gain approval from the community. After the approval, school grants are provided to the committees, and the plan is implemented with the grants and the community's own resources. In this experiment, the first financial and resource management trainings were conducted in December 2012, and school grants were provided in January 2013. Since this was a new intervention, EPT revised training contents based on the results of the first school year, and conducted the second financial and resource management trainings for committee members in October 2013[4], and the second grants were provided in November 2013.

The amount of the grants provided to a school is calculated based on the number of the students: If the total student number is 50 or more, the amount for the school is FCFA 2,000 (US$ 4.05) per student times the total number per year; and if the student number is less than 50, the amount provided to the school was FCFA 100,000 (US$ 202) per year. These amounts were set taking into account the size of the country's economy, the public spending in primary education[5], and future prospects for external assistance[6]. The total amount provided for 120

[4] When these grants and training interventions were scaled-up to 2,000 schools in other districts in 2016 through the support of the Global Partnership for Education (GPE) and the World Bank, the training was conducted only one time since it was not necessary to revise the training contents in the scale-up phase.
[5] In 2012, Niger's GDP per capita was US$ 391.51 (World Bank 2017), government expenditure on primary education was US$ 156 million, and the total enrollment in primary schools was 2 million (UNESCO Institute for Statistics 2017).
[6] The same grant formula was utilized when the grants were introduced by GPE and the World Bank's project.

schools in the first school year was FCFA 26,846,000 (US$ 54,340), and the total amount in the second school year was FCFA 30,066,000 (US$ 60,857)[7].

To evaluate this intervention and understand the mechanism behind the relationship between the interventions and student learning, we collected data by conducting student tests in math and French and interview surveys. The baseline survey was conducted from November through December in 2012, and the end-line survey was conducted in June 2014. The tests were conducted for the same children across the surveys, and these children were in the second, the third, and the fourth grade at the baseline, and most of them became the third, the fourth, and the fifth graders respectively at the end-line exam. The tests were developed and administered by an education non-governmental organization (NGO) from Niger, and were designed at students' grade levels, abiding by the national curricula and textbooks. The math tests assessed arithmetic, geometric shapes and measures, and logic, and the French tests assessed writing, reading, and oral skills. Interviews were conducted with school directors, teachers, school committee members, and students' fathers (or another family member when the father is unavailable).

3. Empirical Methodology

The effects of the two interventions can be estimated by the following equations:

$$y_{ij} = \alpha + \beta_1 GRANT_j + \beta_2 TRAINING_j + X_{ij} + \varepsilon_{ij} \quad (1)$$

where y_{ij} is an outcome of a student *i* at school *j*, $GRANT_j$ is a dummy equal to 1 if a school *j* is assigned into the Grants-only group, and received school grants but did not have training for

[7] The amounts of other experimental grants are US$ 500 per school in Gambia (Blimpo, Evans and Lahire 2015), US$ 870 in Indonesia (Pradhan et al. 2014) , US$ 209 per school (US$ 1.83 per student on average) in Niger (Beasley and Huillery 2016), and US$ 3,190 per school in Senegal (Carneiro et al. 2016) .

learning, and zero otherwise, $TRAINING_j$ is a dummy equal to one if a school *j* is assigned into the Grants-plus-Training group, and received training for learning as well as school grants, and zero otherwise, X_{ij} is a vector of control variables, including strata dummies and baseline outcome value when available. The parameters of interest are β_1, which is the average treatment effect of the Grants-only intervention, and β_2, which is the average treatment effect of the Grants-plus-Training.

4. Results

This section first describes school, teacher, and children characteristics at the baseline survey and sees the balance between the treatment and the control schools. Then, I estimate the impacts on students' test scores and perceptions on learning math and French, and analyze the effect on school committee activities, student effort, and parent effort, which could have affected the test scores. Lastly, I present the heterogeneous impact by students' baseline test scores and the cost-effectiveness of the resource management training.

Baseline School and Student Characteristics

Table 1 shows the baseline school characteristics such as number of students and teachers, proportion of female students, female teachers, and contract teachers, and director's experience. We also checked data on supplementary or night classes, which are often conducted in schools and communities in Niger. The results of the t-test show that no systematic difference was found across the three groups.

Table 2 presents pretreatment balance of student test scores and students' perceptions on learning math and French. In the interview survey, students are given statements "I enjoy learning mathematics (or French)" and "I usually do well in mathematics (or French)" and are asked to evaluate it by "5 = strongly agree," "4 = agree," "3 = neither agree or disagree," "2 =

disagree," or "1 = strongly disagree." We report estimates of β_1 (Grants-only school) and β_2 (Grants-plus-Training school) in equation (1), where y_{ij} is replaced by baseline outcome values. The result shows that these outcomes also have no systematic differences among the three groups.

Table 3 presents pretreatment balance of school committees' activities. As explained in the second section, even without the experimental interventions, school committees in Niger conduct various activities with schools' and communities' own resources, and we divided these activities into 14 categories. Estimation methodology is same as in table 2, using equation (1). The result shows that these outcomes also have no systematic differences among the three groups.

Classroom (column 1) is an activity to build or repair classrooms and is frequently implemented by school committees in Niger. Furniture (column 2) is to make or purchase school furniture such as desks and chairs. Textbook (column 3) and School Supply (column 4) are to purchase textbooks and stationaries for students. Teacher Training (column 5) and Teacher Guide (column 6) are to support schools in conducting training and providing guidebooks for teachers. Awareness (column 7) is an activity implemented for parents to understand the importance of education and encourage parents to send their children to school. Night Class (column 8) is an activity to support students' night study, which is conducted during evenings as out-of-school activities because parents think that regular class hours are not enough for their children's learning. To support this activity, school committees buy night lamps and oil for the lamps. Supplemental class (column 9) is an activity to support a school to implement supplemental lessons outside of school hours, usually on Thursday afternoons or on Saturdays, and school committees sometimes provide tuition fee for teachers. Tutoring (column 10) is teaching for individual students. Student Attendance (column 11) and Teacher Attendance (column 12) are activities to monitor students' and teachers' attendance. Practice Exam (column 13) is an activity conducted for sixth graders to practice an exam for preparing for graduation

examination. Student Award (column 14) is an activity to give an award to students who had excellent performance. The ordinary least squares (OLS) estimates show that most activities have no systematic difference across groups, except Night Class and Student Award before the interventions.

Student Test Scores and Perceptions in Math and French

Table 4 reports the estimates of the effect on student test scores in math and French one and half years after the intervention started. Results show that, while grants alone did not improve student learning, additional training improved student test scores in both math and French, except fourth graders' French. The average test score of the Grants-only group students was 0.01 standard deviations higher in math and 0.07 standard deviations lower in French, relative to the comparison group students' test score, and the difference is statistically insignificant. Meanwhile, the average score of the Grants-plus-Training group students was 0.41 standard deviations higher in math and 0.28 standard deviations higher in French, compared to the comparison group students' test score.

Table 5 estimates program impact on student perceptions on learning math and French. The first and the second columns show that there was no impact on how much students like math and French. This result is not surprising, since the mean in math and French of the comparison group was 4.72 and 4.58 out of 5, respectively, which means that most of the comparison group students answered that they liked math and French very much, and therefore, it is difficult to detect the difference across the groups.

The third and the forth columns show that students of the Grants-plus-Training group increased confidence in learning. At the end-line, the mean of the comparison group was 3.23 in math and 3.16 in French; the mean of the Grants-only group was 3.30 in math and 3.05 in French; and the mean of the Grants-plus-Training group was 3.62 in math (nearly 10% more

than the mean of the comparison group) and 3.42 in French (nearly 8% more than the mean of the comparison group).

School Committee Activities

Table 6 reports how the interventions affected varieties of school committee's activities. The estimates show that both grants alone and Grants-plus-Training increase purchasing textbooks and school supplies: in comparison schools, around 40 percent of committees purchased textbooks (column 3), around 50 percent of committees invested in school supplies (column 4), and around 30 percent of committees invested in teachers' guides (column 6); on the other hand, in both Grants-only group and Grants-plus-Training schools, more than 90 percent of the committees purchased textbooks, more than 80 percent of committees purchased school supplies, and more than 80 percent of committees bought teachers' guides. However, the poor result on student learning in the Grants-only group suggests that these additional inputs have little impact on student learning.

The difference between the Grants-only group and the Grants-plus-Training group is found in activities on supplementary class (column 8), night class (column 9), tutoring (column 10), and student award (column 14). For example, while around 50 percent of comparison school committees and Grants-only committees invested in supplementary classes, more than 80 percent of Grants-plus-Training committees supported supplementary classes. Regarding night classes, although the percentage of the Grants-only group that did the activity is around 25 percent more than that of comparison committees, the percentage of the Grants-plus-Training committees is 43 percent more than that of comparison committees. The high performance of student learning at the Grants-plus-Training schools can be partly attributed to these activities.

Student Effort

Table 7 estimates how student study has changed after the intervention. The first and the second columns show how much percentage of students attended supplemental and night classes. These results suggest that Grants-plus-Training increases student attendance in supplemental and night classes, and are consistent with the results of school committee activities in table 6, where Grants-plus-Training increased support for these classes. The third column shows that Grants-plus-Training increases student home study by 0.45 hour, while Grants-only has little impact. The fourth column indicates that this home study is supported by a family member, mostly by older brothers and sisters according to our interview survey.

Parental Effort

Table 8 displays how much parents contribute to and participate in school committees' activities and are engaged in their children's education. The first column shows that comparison school parents, Grants-only parents, and Grants-plus-Training parents contribute around FCFA 1,750, FCFA 1,790, and FCFA 2,250 on average to their school committees, respectively. Although the difference between the comparison and Grants-only groups is insignificant, the Grants-plus-training parents pay almost 30 percent more than the comparison group parents, and the difference is significant. Grants-plus-Training parents also make more commitment to school committees' activities in terms of the attendance to school committee meetings. Parental participation rate in community meetings, which are organized by school committees four times in a year, also increased in Grants-plus-Training. The average attendance rate of the comparison group is 2.25 times, and that of the Grants-plus-Training parents is about 10 percent more than that of comparison parents.

In our interview survey with parents, we asked them whether they received test score cards from their children's school, and, if the answer is yes, we asked parents whether they discussed about the performance with their children and teachers. The third column indicates

that Grants-plus-Training induces parents to discuss with their children. The fourth column shows that five percent more parents discuss with teachers on their children's performance at the Grants-plus-Training group than parents of the comparison group, although the difference is not statistically significant.

Heterogeneous Impact by Baseline Test Scores

Table 9 presents heterogeneous impact on student test scores by dividing the students into quintiles, based on the average test scores at the baseline survey. The effect of the resource management training is largest for the lowest-performing children (0.61 standard deviations), and is positive and statistically significant for both the second lowest-performing children (0.39 standard deviations) and the middle-performing children (0.39 standard deviations). Although the effect is also positive for the highest-performing children (0.19 standard deviations) and the second highest-performing children (0.14 standard deviations), it is not statistically significant.

To explore the reason of this heterogeneity, Table 10 displays the effects on children's study behavior by the same quintile. Looking at the mean of the comparison group of panels A-D, higher-performing children tend to attend more remedial and night classes, and study more at home, and their families tend to help the children's home studies. OLS estimates suggest that the training intervention induced lower-performing children to attend more classes and study more at home, and their families to support children's home study. These behavioral responses can explain the improvement in the test scores of low-performing children.

Cost-effectiveness

This section discusses the cost-effectiveness of the resource management training. For the calculation, I utilized the methodology described by Dhaliwal et al. (2014), who provide a comprehensive way to calculate intervention costs and impact for the purpose of comparing cost-effectiveness of different programs.

The total cost to implement this training intervention for sixty schools was US$ 24,790,[8] which includes (i) training for school committee members (US$ 17,383); (ii) monitoring of school activities (US$ 224); (iii) staff salaries (US$ 4,759); and (iv) communities' contributions[9] (US$ 2,424). Following Pradhan et al. (2014), this does not include the cost of the grant provision, and the impact in this calculation is the effect of the resource management training alone, calculated by subtracting the effect of the grants from the effect of grants plus training.

Using this calculation, the resource management training increased the overall test score by 9.13 standard deviations per every US$ 100 spent, math scores by 9.16 standard deviations per US$ 100, and French scores by 8.02 standard deviations per US$ 100.[10] This indicates that the resource management training is a highly cost-effective intervention to improve learning compared to other interventions cited in Kremer, Brannen, and Glennerster (2013) .[11]

5. Conclusion

This paper examines the impact of school grants and training for school committees to increase communities' awareness of student learning and improve resource management. The study finds

[8] The training and grant provision were implemented from 2012 through 2013, and I used 10 % discount rate for the cost and impact in 2013 as suggested by Dhaliwal et al. (2014). The cost per school is reduced when the intervention is scaled up, since the training was conducted two times (pilot and complementary training) in the experiment, while it is conducted only one time when scaling-up. Since one time training may not guarantee the same impact, the cost for the second training is included in this analysis, following Dhaliwal et al. (2014)'s suggestion. Therefore, the training intervention can be more cost-effective than this estimation in the scaling-up phase depending on the impact gained.

[9] Dhaliwal et al. (2014) recommend including the cost to beneficiaries.

[10] Another way often utilized for showing cost-effectiveness is cost per tenth of standard deviation per child. Using this calculation method, the resource management training costs US$ 0.98 per tenth of standard deviation per child. However, methodologies to calculate the cost-effectiveness are slightly different among papers.

[11] Among 30 primary education programs cited in this review, four programs gained larger standard deviations per US$ 100 than our intervention: providing earnings information in Madagascar (Nguyen 2008); tracking by achievement in Kenya (Duflo et al. 2011), hiring contract teachers instead of civil service in Kenya (Duflo et al. 2015); and election of school committee members and linking with village authorities (Pradhan et al. 2014). However, careful attention to the context is necessary when comparing the cost-effectiveness since the goals of interventions and the meaning of a standard deviation can be different among experiments as Kremer, Brannen, and Glennerster (2013) noted.

that providing monetary grants alone has limited impact on student performance. School grants were utilized to purchase textbooks, teacher's guides, and school supplies, but these inputs may not have been utilized effectively when communities have little knowledge on learning outcome. This result is consistent with previous studies which conclude that providing school inputs such as monetary grants, textbooks, or teaching materials is not sufficient to improve learning. However, by conducting additional training for school committees, student test scores in math and French have remarkably increased, particularly for low-performing children.

Compared to other educational interventions that have been tested in the developing world, the resource management training is cost-effective for improving learning. This is primarily because the effect sizes are large (see McEwan 2015 for a review of other interventions), rather than because the cost is low. A possible reason for this large impact is that the intervention activated several channels that enhanced student learning. First, by providing schools and communities with knowledge on effective resource management, they have promoted after-class studies that directly increase study hours and an activity that motivates students to study more. Second, by providing information about student performance at the community assembly, communities have realized that most children were not learning the basics at school, and they were motivated to increase their contribution to school committee activities. Third, parents have taken more interest in their children's study and did more discussion with teachers and children, and provided more support for their children's home studies.

Several policy implications can be drawn from this study. First, school grant program can produce huge impact with complementary interventions that can overcome the weakness of community participation. Even when communities do not have enough capacity, school inputs can be effectively utilized by providing knowledge on means for improving learning. Also, reduction of parental efforts in response to school inputs can be mitigated by raising awareness on their children's learning. Second, it matters how information reaches parents. Even when student report cards are provided, parents may not understand it if they have little schooling and

are illiterate. By providing an opportunity for parents to understand the real level of their children's learning, parents will be motivated to increase their efforts for their children's learning. However, careful attention is necessary when individual information is provided, since it can widen the gap between stronger and weaker children if parents tend to invest more in the former.[12] Third, while the result of the resource management training is notable, particularly in that it benefits low-performing children and can prevent widening the gap from high-performing children, this intervention alone may face a limit as children's overall learning level advances, since its effect is relatively weak for higher-level children. Acknowledging the necessity of additional interventions, EPT and JICA have introduced "Math Drills" and "Learning Camps" in their programs in Niger and Madagascar. "Math Drills" were developed based on math workbooks utilized in Japan's math education; and "Learning Camps" is a literacy intervention originally developed by Pratham, an Indian education NGO, and proved highly effective in improving children's literacy skills in India (Banerjee et al. 2016). In fact, any one prescription is not enough to overcome the formidable learning challenges in the developing world. We need to exert continuous efforts to mobilize existing evidence as well as to accumulate new evidence for fighting the learning crisis.

[12] Studies of Akresh, Bagby, de Walque, and Kazianga (2012) and Dizon-Ross (2016) suggest that parents invest more in higher ability children's education than lower ability children's education in Burkina Faso and Malawi, respectively.

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Table 1: Pretreatment Balance on School Characteristics

	(1)	(2)	(3)	p-Value (1) = (2)	p-Value (1) = (3)
	Comparison	Grants	Grants plus Training		
Number of students per school	90.60	101.51	106.90	0.44	0.29
Number of teachers per school	3.90	4.10	4.18	0.72	0.63
Student-teacher ratio	26.10	27.71	27.20	0.51	0.61
Proportion of female students	0.48	0.48	0.45	0.97	0.19
Proportion of female teachers	0.33	0.41	0.36	0.25	0.63
Proportion of contract teachers	0.83	0.84	0.89	0.82	0.11
Director's experience in years	6.70	6.46	6.04	0.79	0.47
Conduct supplementary or night classes	0.66	0.71	0.64	0.55	0.85

Table 2: Pretreatment Balance on Student Test Scores and Perceptions

VARIABLES	(1) Overall Test Score	(2) Math Test Score	(3) French Test Score	(4) Like Math	(5) Like French	(6) Confident in Math	(7) Confident in French
Grants	0.069	0.019	0.141	0.075	0.047	0.009	0.053
	(0.105)	(0.106)	(0.122)	(0.074)	(0.071)	(0.250)	(0.189)
Grants plus Training	-0.113	-0.105	-0.099	0.012	0.003	-0.193	0.123
	(0.097)	(0.100)	(0.109)	(0.080)	(0.077)	(0.228)	(0.167)
Observations	4,328	4,330	4,492	4,349	4,369	4,443	4,171
R-squared	0.072	0.060	0.064	0.044	0.046	0.039	0.032
Mean in comparison schools	0.000	0.000	0.000	4.462	4.478	3.477	2.898

Notes: Test scores are normalized so that the mean and standard deviation of the comparison group are zero and one. Overall test score is the average of the normalized test scores in math and French of each student. Columns 4/5 and 6/7 show how much students agree with the statements "I enjoy learning mathematics/ French," and "I do well in mathematics/ French," respectively, and the answers are coded by "5 = strongly agree," "4 = agree," "3 = neither agree or disagree," "2 = disagree," or "1 = strongly disagree." Strata and grade dummies are included in all estimations but are not shown. Robust standard errors are clustered at the school level and are in parentheses.

*** Significant at 1% level. ** Significant at 5% level. * Significant at 10% level.

Table 3: Pretreatment Balance on School Committees' Activities

VARIABLES	(1) Classroom	(2) Furniture	(3) Textbook	(4) School Supply	(5) Teacher Training	(6) Teacher Guide	(7) Awareness
Grants	-0.067	0.050	0.033	-0.033	-0.083	-0.000	0.167*
	(0.075)	(0.048)	(0.088)	(0.086)	(0.077)	(0.084)	(0.090)
Grants plus Training	-0.037	-0.000	-0.093	-0.027	0.019	-0.076	0.125
	(0.071)	(0.040)	(0.085)	(0.090)	(0.083)	(0.087)	(0.089)
Observations	179	179	179	179	179	179	179
R-squared	0.067	0.070	0.186	0.117	0.039	0.172	0.085
Mean in comparison schools	0.833	0.050	0.467	0.450	0.250	0.433	0.550

VARIABLES	(8) Supplemental Class	(9) Night Class	(10) Tutoring	(11) Student Attendance	(12) Teacher Attendance	(13) Practice Exam	(14) Student Award
Grants	-0.000	0.150*	-0.087	0.050	-0.033	-0.067	0.117
	(0.090)	(0.086)	(0.065)	(0.074)	(0.083)	(0.080)	(0.092)
Grants plus Training	-0.041	0.038	-0.033	0.012	-0.041	0.020	0.006
	(0.089)	(0.089)	(0.070)	(0.076)	(0.084)	(0.083)	(0.091)
Observations	179	179	178	179	179	179	179
R-squared	0.076	0.126	0.055	0.109	0.099	0.186	0.063
Mean in comparison schools	0.633	0.350	0.186	0.767	0.717	0.333	0.383

Notes: Strata dummies are included in all estimations but not shown. Robust standard errors are in parentheses.
*** Significant at 1% level. ** Significant at 5% level. * Significant at 10% level.

Table 4: Effect on Test Scores

	Overall Test Score				Math Test Score				French Test Score			
VARIABLES	All Grades	Grade 3	Grade 4	Grade 5	All Grades	Grade 3	Grade 4	Grade 5	All Grades	Grade 3	Grade 4	Grade 5
Grants	-0.052	0.008	-0.004	-0.159	0.009	0.093	0.001	-0.058	-0.073	-0.064	0.053	-0.203
	(0.092)	(0.118)	(0.116)	(0.141)	(0.104)	(0.134)	(0.139)	(0.172)	(0.091)	(0.123)	(0.120)	(0.135)
Grants plus Training	0.343***	0.465***	0.218*	0.358**	0.405***	0.530***	0.356**	0.365**	0.275***	0.415**	0.087	0.327**
	(0.087)	(0.143)	(0.128)	(0.139)	(0.102)	(0.160)	(0.171)	(0.163)	(0.090)	(0.164)	(0.112)	(0.133)
Baseline Test Score	0.428***	0.346***	0.449***	0.515***	0.399***	0.321***	0.426***	0.460***	0.319***	0.297***	0.313***	0.391***
	(0.038)	(0.059)	(0.059)	(0.060)	(0.038)	(0.052)	(0.058)	(0.064)	(0.036)	(0.065)	(0.060)	(0.042)
Observations	3,572	1,223	1,148	1,201	3,573	1,223	1,149	1,201	3,707	1,279	1,205	1,223
R-squared	0.238	0.211	0.286	0.338	0.204	0.168	0.285	0.284	0.153	0.165	0.147	0.279

Notes: Test scores are normalized so that the mean and standard deviation of the comparison group are zero and one. Overall test score is the average of the normalized test scores in math and French of each student. Strata and grade dummies are included in all estimations but are not shown. Robust standard errors are clustered at the school level and are in parentheses.
*** Significant at 1% level. ** Significant at 5% level. * Significant at 10% level.

Table 5: Effect on Student Perceptions on Math and French

VARIABLES	(1) Like Math	(2) Like French	(3) Confident in Math	(4) Confident in French
Grants	-0.040	-0.120	-0.003	-0.106
	(0.045)	(0.095)	(0.145)	(0.154)
Grants plus Training	0.026	0.046	0.324**	0.261*
	(0.046)	(0.083)	(0.140)	(0.137)
Baseline Perception	0.046*	0.001	-0.006	0.006
	(0.026)	(0.038)	(0.026)	(0.033)
Observations	3,585	3,591	3,677	3,449
R-squared	0.033	0.048	0.071	0.098
Mean in comparison schools	4.718	4.575	3.299	3.160

Notes: Columns 1/2 and 3/4 show how much students agree with the statements "I enjoy learning mathematics/ French," and "I do well in mathematics/ French," respectively, and the answers are coded by "5 = strongly agree," "4 = agree," "3 = neither agree or disagree," "2 = disagree," or "1 = strongly disagree." Strata dummies are included in all estimations but not shown. Robust standard errors are clustered at the school level and are in parentheses.
*** Significant at 1% level. ** Significant at 5% level. * Significant at 10% level.

Table 6: Effect on School Committees' Activities

VARIABLES	(1) Classroom	(2) Furniture	(3) Textbook	(4) School Supply	(5) Teacher Training	(6) Teacher Guide	(7) Awareness
Grants	0.074	0.087	0.502***	0.376***	0.047	0.457***	-0.020
	(0.079)	(0.054)	(0.075)	(0.078)	(0.074)	(0.081)	(0.092)
Grants plus Training	0.106	0.068	0.486***	0.376***	0.023	0.494***	-0.058
	(0.077)	(0.051)	(0.079)	(0.080)	(0.071)	(0.082)	(0.090)
Observations	179	179	179	179	179	179	179
R-squared	0.108	0.085	0.325	0.253	0.101	0.275	0.128
Mean in comparison schools	0.712	0.051	0.390	0.458	0.169	0.305	0.559

VARIABLES	(8) Supplemental Class	(9) Night Class	(10) Tutoring	(11) Student Attendance	(12) Teacher Attendance	(13) Practice Exam	(14) Student Award
Grants	0.082	0.246***	0.102	-0.028	-0.073	0.017	0.072
	(0.088)	(0.084)	(0.062)	(0.089)	(0.090)	(0.069)	(0.080)
Grants plus Training	0.329***	0.434***	0.142**	-0.084	-0.008	0.024	0.302***
	(0.082)	(0.083)	(0.064)	(0.089)	(0.088)	(0.069)	(0.084)
Observations	179	179	179	179	179	179	179
R-squared	0.202	0.262	0.127	0.143	0.158	0.115	0.243
Mean in comparison schools	0.475	0.305	0.085	0.559	0.508	0.169	0.254

Notes: Strata dummies and baseline outcome variables are included in all estimations but not shown. Robust standard errors are in parentheses.
*** Significant at 1% level. ** Significant at 5% level. * Significant at 10% level.

Table 7: Effect on Student Study

VARIABLES	(1) Attend Remedial Class	(2) Attend Night Class	(3) Study Hours at Home	(4) Family Helps Home Study
Grants	0.054	0.041	0.030	-0.003
	(0.067)	(0.061)	(0.136)	(0.047)
Grants plus Training	0.236***	0.150**	0.450***	0.108***
	(0.070)	(0.062)	(0.146)	(0.039)
Observations	2,781	3,199	3,455	3,274
R-squared	0.142	0.187	0.062	0.092
Mean in comparison schools	0.292	0.344	1.389	0.551

Notes: Strata dummies are included in all estimations but not shown. Robust standard errors are clustered at the school level and are in parentheses.
*** Significant at 1% level. ** Significant at 5% level. * Significant at 10% level.

Table 8: Effect on Parental Effort

VARIABLES	(1) Contribution to committee (FCFA)	(2) Attendance of committee meeting	(3) Discuss with child	(4) Discuss with teacher
Grants	42.979	0.078	0.036	-0.005
	(219.320)	(0.111)	(0.040)	(0.045)
Grants plus Training	502.794*	0.227**	0.085**	0.051
	(276.305)	(0.115)	(0.037)	(0.039)
Observations	1,978	2,331	1,949	1,949
R-squared	0.052	0.064	0.048	0.057
Mean in comparison schools	1748.702	2.257	0.758	0.686

Notes: Strata dummies are included in all estimations but not shown. Robust standard errors are clustered at the school level and are in parentheses.
*** Significant at 1% level. ** Significant at 5% level. * Significant at 10% level.

Table 9: Effect on Test Scores by Quintile of Baseline Test Scores

	(1)	(2)	(3)	(4)	(5)
	Overall Test Score				
	Quintile 1	Quintile 2	Quintile 3	Quintile 4	Quintile 5
Grants	0.070	0.098	0.075	-0.213*	-0.248
	(0.101)	(0.099)	(0.109)	(0.117)	(0.162)
Grants plus Training	0.605***	0.387***	0.393***	0.144	0.188
	(0.112)	(0.100)	(0.106)	(0.122)	(0.180)
Baseline Test Score	0.641**	0.054	-0.080	0.687***	0.341***
	(0.264)	(0.295)	(0.227)	(0.183)	(0.078)
Observations	723	675	717	717	740
R-squared	0.231	0.126	0.130	0.097	0.173

Notes: Students are divided by quintile of the baseline test scores, from lowest (Quintile 1) through highest (Quintile 5), and are aggregated over all grades. Overall test score is the average of the normalized test scores in math and French of each student. Strata and grade dummies are included in all estimations but are not shown. Robust standard errors are clustered at the school level and are in parentheses. Results are aggregated over three grades and two subjects.
*** Significant at 1% level. ** Significant at 5% level. * Significant at 10% level.

Table 10: Effect on Student Study by Quintile of Baseline Test Score

	(1)	(2)	(3)	(4)	(5)
	Overall Test Score				
	Quintile 1	Quintile 2	Quintile 3	Quintile 4	Quintile 5
Panel A: Attend Remedial Class					
Grants	0.127	0.070	0.034	-0.044	-0.018
	(0.084)	(0.100)	(0.084)	(0.088)	(0.091)
Grants plus Training	0.430***	0.255**	0.210**	0.115	0.106
	(0.082)	(0.105)	(0.089)	(0.091)	(0.098)
Mean in comparison schools	0.192	0.255	0.265	0.358	0.391
Panel B: Attend Night Class					
Grants	0.062	0.115	0.031	0.017	-0.100
	(0.083)	(0.075)	(0.073)	(0.074)	(0.103)
Grants plus Training	0.280***	0.213***	0.107	0.168**	0.012
	(0.085)	(0.074)	(0.084)	(0.072)	(0.110)
Mean in comparison schools	0.263	0.206	0.369	0.330	0.553
Panel C: Study Hours at Home					
Grants	-0.158	-0.028	0.176	0.127	-0.091
	(0.170)	(0.177)	(0.187)	(0.200)	(0.235)
Grants plus Training	0.508**	0.566***	0.466**	0.176	0.419
	(0.221)	(0.193)	(0.211)	(0.206)	(0.287)
Mean in comparison schools	1.282	1.337	1.308	1.433	1.631
Panel D: Family Helps Student Study					
Grants	-0.017	0.061	-0.060	-0.025	-0.117*
	(0.081)	(0.071)	(0.062)	(0.065)	(0.064)
Grants plus Training	0.253***	0.149**	0.015	0.057	0.014
	(0.070)	(0.067)	(0.059)	(0.067)	(0.055)
Mean in comparison schools	0.473	0.495	0.584	0.578	0.614

Notes: Students are divided by quintile of the baseline test scores, from lowest (Quintile 1) through highest (Quintile 5), and are aggregated over all grades. Strata dummies are included in all estimations but not shown. Robust standard errors are clustered at the school level and are in parentheses.

*** Significant at 1% level. ** Significant at 5% level. * Significant at 10% level.

Abstract (in Japanese)

要約

2000 年以降、多くの途上国で、地域住民が学校のリソースを管理する教育政策が導入されてきた。しかし、近年の研究は、この種の政策が児童の学力向上にあまり効果的でないことを示唆している。本研究では、地域住民が学校の資金を効果的に活用するための施策を検討するため、ニジェールにおいてランダム化比較試験（Randomized Controlled Trial: RCT）を実施し、地域住民を代表する学校委員会に学校補助金を供与するとともに、地域住民が児童の学習に対する意識を高め、資金の活用方法を改善するための研修を実施した。その結果、補助金の供与だけでは学力への効果が見られなかったが、研修を併せて実施することにより、課外学習など児童の努力を促す活動が増加し、児童のテストスコア（算数、フランス語）が大幅に向上した。また、子どもが基本的なスキルを身につけていないことに親が気づき、親の学校への貢献や家庭における学習支援が増加するという副次的な効果も見られた。この研究結果から、住民参加や学校補助金政策の有効性を高めるためには、地域住民に情報や知識を共有し課題に対する意識を高めることが重要であると示唆される。

キーワード： 教育、地方分権、アカウンタビリティ、フィールド実験

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