Can Technology Transform Teacher-Parent Communication? Evidence from a Randomized Field Trial

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I. Background/Context

The emergence of mobile-based communication applications (apps) presents new opportunities to more effectively connect schools with families given that access to smartphones is becoming near universal (Pew Research Center, 2018). Since 2010, a large marketplace has developed around these mobile-based apps. However, little is understood about who uses them, how they are used, and what their effects are on communication quality and students' success in school.

II. Purpose/Objective/Research Question

In this study, we examine usage patterns for a mobile-based communication app, SchoolCNXT, and the importance of user supports for maximizing its potential to improve communications between school and home. We evaluate the effects of supplementing access to SchoolCNXT with intensive implementation supports on a range of outcomes including usage measures, perceptions about school communication quality, student achievement, and absenteeism. We extend our experimental and matching analyses by exploring the black-box of who, when, and how teachers and parents used the app.

III. Setting

The NYC Department of Education (DOE) Division of Family and Community Engagement recruited principals to the study through email and in-person presentations at district leadership meetings. Principals from 132 New York City schools volunteered to participate in the study and received free access to SchoolCNXT during the 2016-17 academic year.

IV. Population/Participants/Subjects

The sample includes a range of school types and levels including elementary, middle, K-8, and high schools as well as early childhood centers and schools the serve children with special needs. In Table 1 we present characteristics of the experimental sample and the broader NYC district.

V. Intervention/Program/Practice

We randomly assign schools to receive intensive training and ongoing guidance on how to use the app such as in-person school visits by a SchoolCNXT coordinator, tailored in-person and online training sessions, regular personalized emails with usage reports and tips, and individual and school-wide recognition incentives for active users. By only providing basic, technical support to control schools, we evaluate the effects of supplementing access to SchoolCNXT with intensive implementation supports on usage measures, perceptions about communication quality in schools, student achievement, and absenteeism.

VI. Research Design

We randomized schools using a matched-pair design in two steps. First, we created non-bipartite matched pairs using a high-dimensional matching algorithm that optimized matches

across a set of 42 covariates based on a Mahalanobius distance measure (Moore, 2012). We then randomly assigned treatment to schools within the 66 matched pairs. As seen in Table 1, the matched pair randomization approach produced well-balanced treatment and control groups with no statistically significant differences in observable characteristics.

VII. Data Collection and Analysis

For approximately normally distributed outcomes, such as student achievement, we estimate treatment effects using the following OLS model:

$$Y_i = \alpha + \beta_1 TREAT_i + \delta X_i + \epsilon_i, \quad (1)$$

where Y_i represents an outcome for teacher, parent, or student i and β_1 represents our estimate of the Intent-To-Treat effect of additional supports. We include a parsimonious vector of controls, X_i, for school characteristics. When we examine student-level outcomes we also include individual student controls.

We model administrator responses to Likert-scale items about the quality of communication with families with an ordered logistic parameterization of Model 1. We model count-measures of app use with a negative binomial parameterization of Model 1.

We complement our primary experimental analyses with non-parametric matching estimates of the effect of receiving free access to SchoolCNXT, with at least basic user supports, relative to not having access to SchoolCNXT at all.

VIII. Findings/Results

We find that providing free access to SchoolCNXT and basic user supports to control schools resulted in low levels of adoption of the new technology. As shown in Figure 1, only 44% of teachers and 13% of parents in the control group ever logged-in to the app to activate their accounts. Total usage rates were also low among the control group, with an average of 2.5 total incidents of usage (i.e. sending a message or posting, clicking on, liking, or saving a post in the app) during the academic year among teachers who activated their accounts. User supports increased teacher activation rates by 15%, and more than doubled overall use as depicted in Figure 2. However, low-adoption rates meant these increases did not measurably improve overall perceptions about the quality of teacher-parent communication among administrators, teachers, or parents.

Our matching analyses show that providing free access to SchoolCNXT with at least basic supports significantly increased teachers' perceptions about communication quality. However, we find no effects on parents' perceptions of communication quality or on student outcomes. Internal app usage data from the following year reported in Figure 3 reveals that, year-on-year, total use among teachers declined 15% across all schools and remained unchanged among parents.

Our qualitative analyses suggest that parents and teachers coordinate to share information or highlight student successes. Parents initiated most conversations (53%), followed by teachers (40%) and then schools (7%). Parents' proactive use of the app suggests a real demand for more information from schools. In contrast to administrators' perceptions that teachers communicated most frequently about negative student issues, Figure 4 reports that only a small fraction of messages (9%) focused on negative aspects of student performance, attendance, behavior, or effort compared to content that was more neutral (72%) or positive (19%).

IX. Conclusions

Our findings highlight the difficulty of improving teacher-parent communication from an organizational perspective. Providing these tools without clear expectations for standardizing communication approaches may complicate matters for parents. After a year of free access to the app, 75% of administrators reported teachers in their schools used multiple, different communication apps for contacting home and 15% of administrators reported the use of at least four different communication apps.

Encouragingly, our experimental results suggest that providing intensive user supports to schools can broaden and increase usage to a degree. New communication technology such as mobile apps have the potential to improve the unstructured and ineffective state of communication with families. Whether this potential is realized will largely depend on the level of organizational support provided to teachers and the quality of implementation.

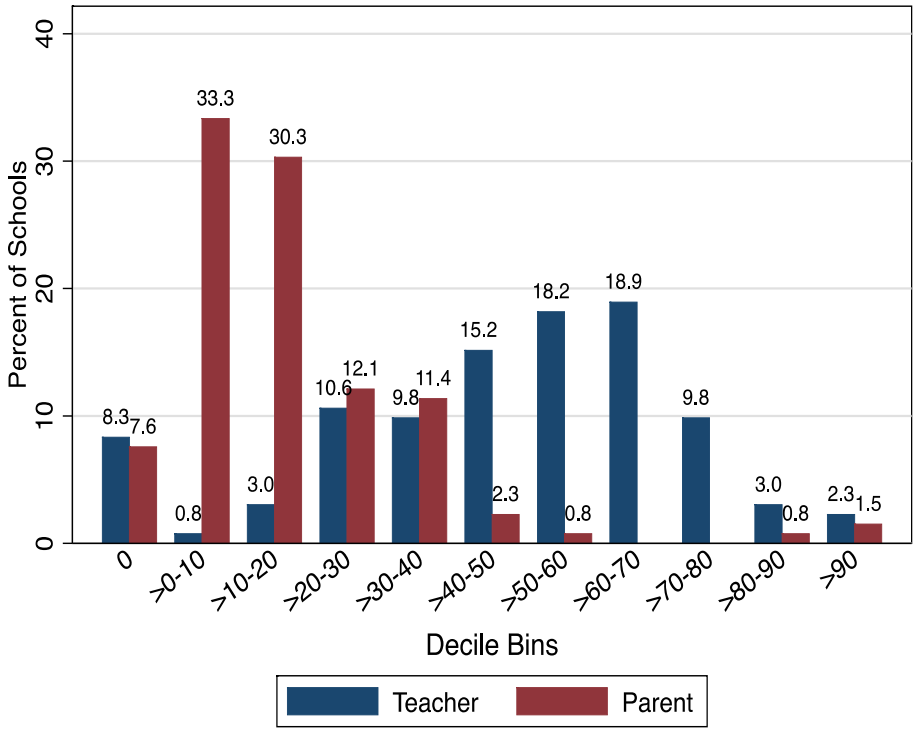


Figure 1: Percent of schools with given activation rates for teachers and parents

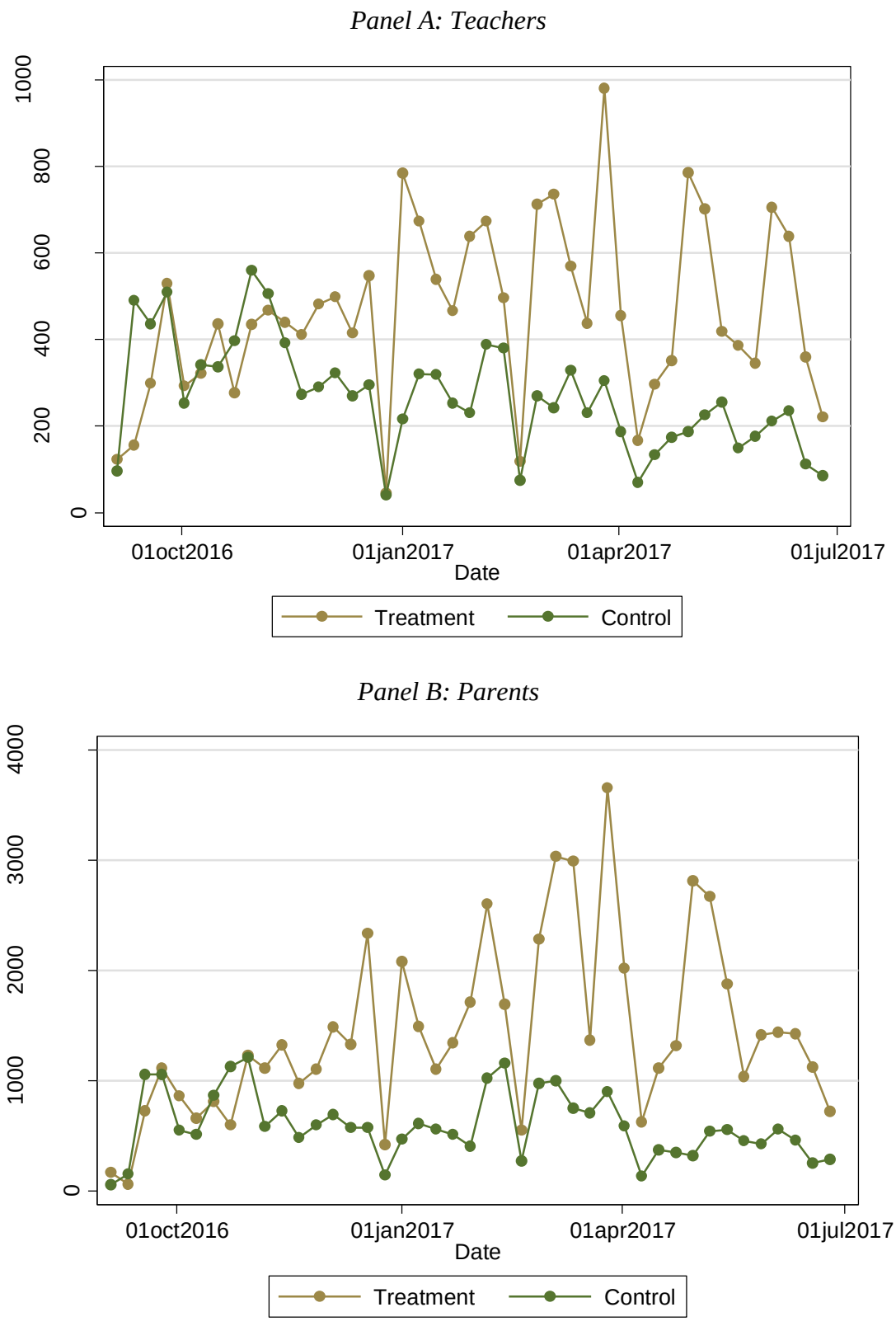
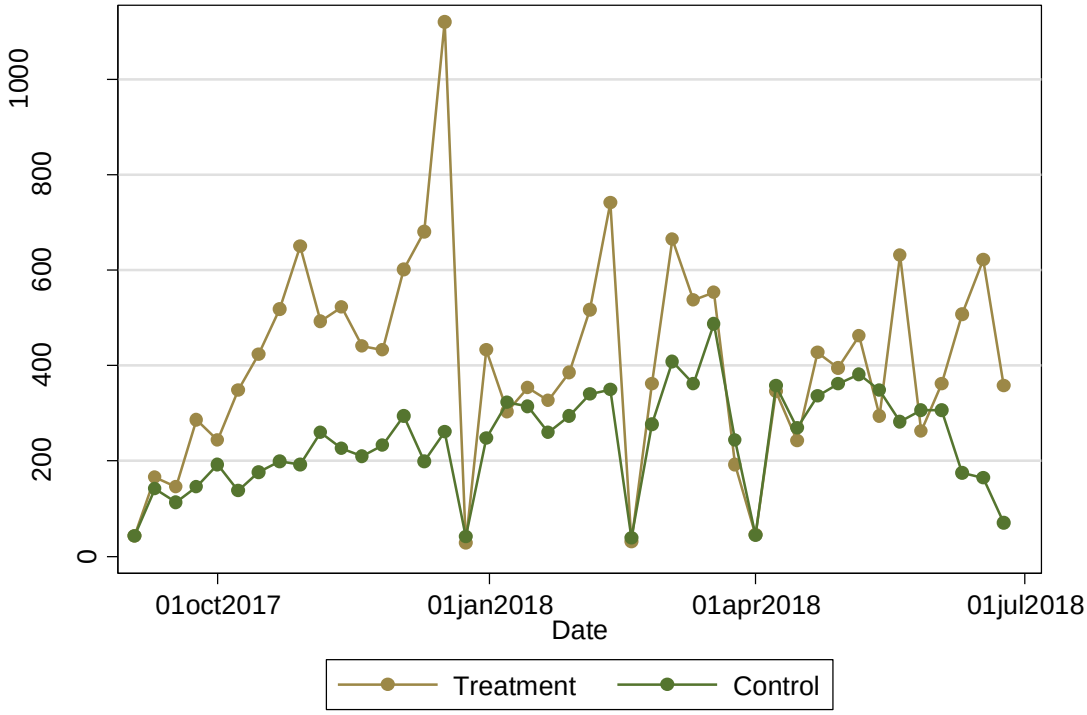


Figure 2: Weekly binned total app use over the school year by treatment and control for teachers (Panel A) and parents (Panel B) in 2016-17

Panel A: Teachers



Panel B: Parents

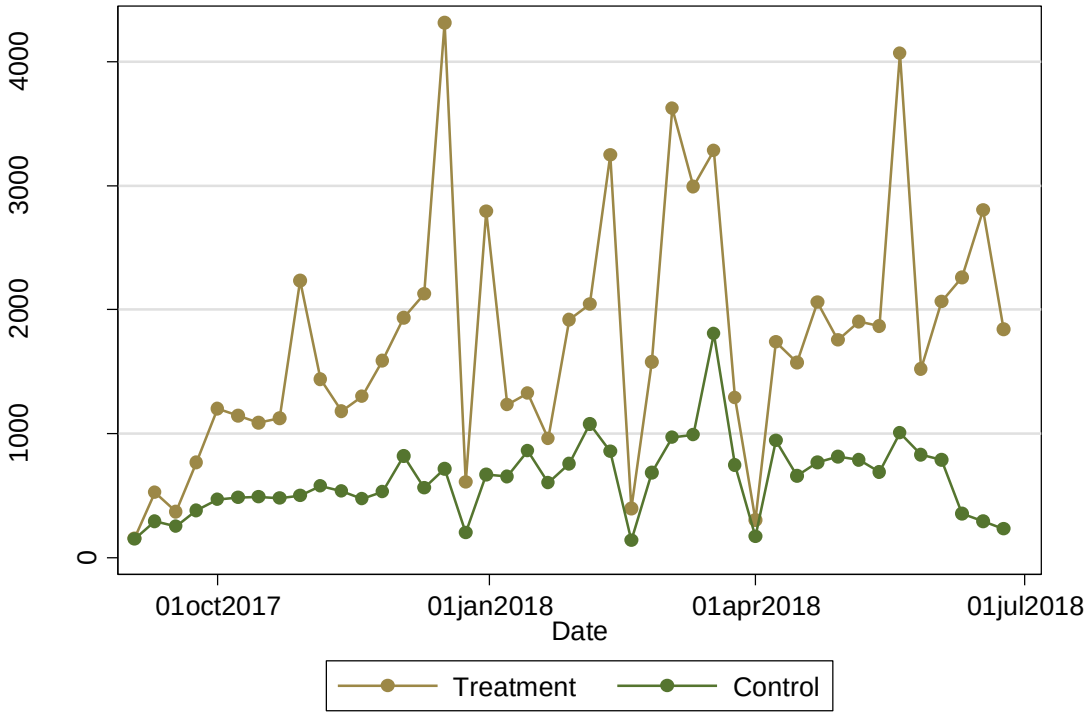


Figure 3: Weekly binned total app use over the school year by treatment and control for teachers (Panel A) and parents (Panel B) in the follow-up year (2017-18)

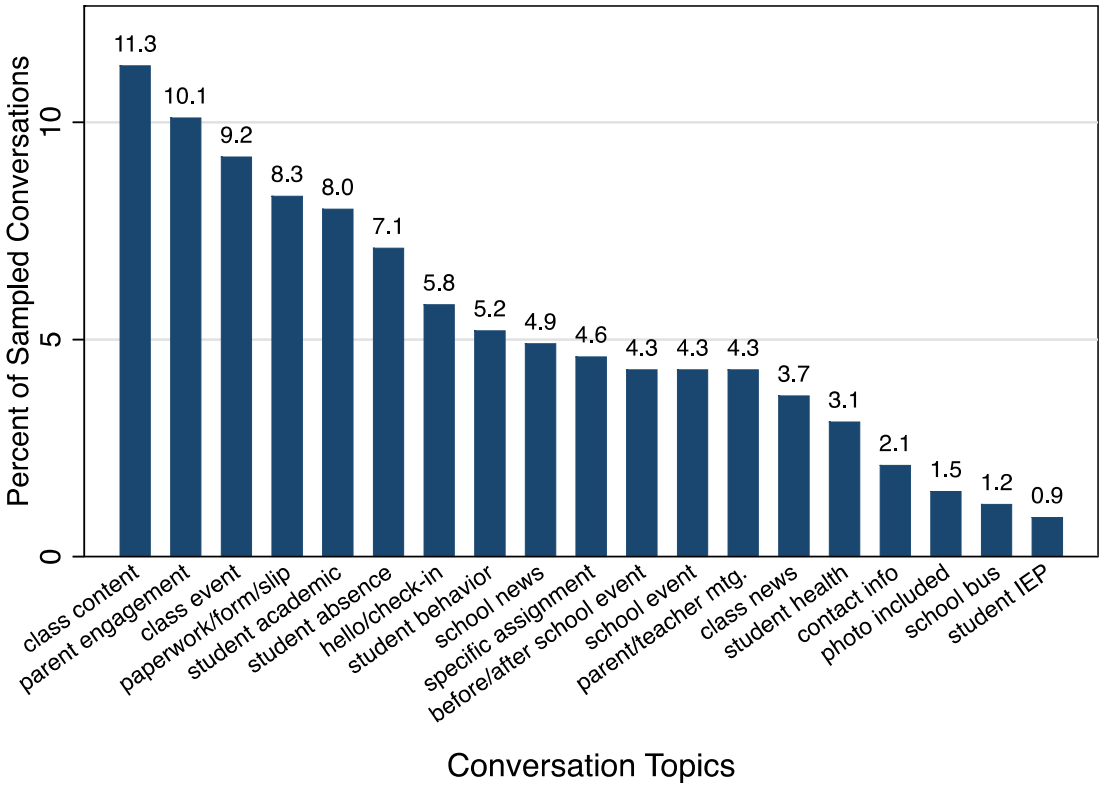


Figure 4: Frequency of topics in 200 randomly sampled conversations

Table 1. School and Teacher Characteristics, 2016-17

	District sample	Experimental sample			
		Full	Control	Treatment	T vs C
School characteristics					
School type					
Special needs	56	4	2	2	1.00
Early childhood	74	4	2	2	1.00
K–8	601	8	4	4	1.00
Elementary	511	62	31	31	1.00
Middle	176	13	6	7	0.77
High	286	41	21	20	0.85
Days absent	14.26	14.88	14.67	15.08	0.74
SWD (%)	22.02	22.25	22.41	22.09	0.89
ELL (%)	13.29	16.16	15.61	16.71	0.68
Male (%)	51.72	51.39	50.61	52.16	0.29
FRPL (%)	73.71	79.50	79.98	79.02	0.72
Race (%)					
African-American	33.51	32.31	31.05	33.57	0.60
Asian	10.59	13.55	13.91	13.19	0.84
Hispanic	41.75	44.29	45.41	43.18	0.62
Other	2.09	1.86	1.71	2.00	0.49
White	12.06	7.99	7.92	8.06	0.95
Teacher characteristics					
Teacher annual salary	78,033	77,495	76,976	78,014	0.35
Female (%)	77.41	79.76	79.45	80.07	0.81
Race (%)					
African-American	21.66	21.62	18.77	24.47	0.12
Asian	5.96	8.24	8.68	7.80	0.65
Hispanic	17.17	18.24	18.86	17.62	0.65
Other	1.94	2.06	2.11	2.02	0.83
White	53.28	49.83	51.58	48.08	0.38
n(School)	1,704	132	66	66	

Notes: With the exception of School Types, Days Absent, Days Present, and Teacher Annual Salary, all values are percents from 0-100. The "T vs. C" column reports the p-value for the null hypothesis that the treatment (T) and control (C) distributions are significantly different from one another for a given covariate. Teacher annual salary is reported in dollars. Special needs schools refer to schools in the NYC district that specifically serve students with disabilities. SWD refers to students with disabilities; ELL refers to English language learning students; FRPL refers to students receiving free or reduced price lunch.