

A Randomized Evaluation of an On-Site Training for Kindergarten Teachers in Rural Thailand

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- This paper investigates the effectiveness of an intensive on-site teacher training in kindergarten classes of rural schools in Roi-Et province.
 - On-Site Training: Trainees/teachers have to learn and practice with real students at a qualified training center/school
 - Intensive Training: continuously for 2 weeks
- Key findings:
 - **1** The intervention led to an increase the effectiveness of the classroom in terms of children's cognitive skills by almost 50 percent relative to the control group.
 - **2** The on-site training intervention is cost-effective, costing 32.7 USD per student.



Solution: On-site training for 2 weeks (10 school days).

- Learning by doing in real classrooms with real students.
- The first 3 days: observe teachers' and students' behaviors.
- The rest is for the trainees to practice implementing all key activities and producing learning materials.
- There is a daily review session with an early childhood education expert.
- The training strongly emphasized implementing the plan-do-review process (PDR).
- The main objective is to enable the trainees to implement a HighScope-based curriculum, called RIECE curriculum, in their classrooms.



- Every participating teacher attended an In-Class training for 2 days at the beginning of the project
- An In-Class training delivers lectures about the following theoretical concepts of the RIECE curriculum, a HighScope-based curriculum:
 - Active Learning
 - Adult-Child Interaction
 - Learning Environment
 - Daily Routine
 - Assessment: Key Developmental Index (KDI)
- School Visits: Every participating classroom was visited by an early childhood education expert twice throughout the project



- This study was exclusively conducted in kindergarten classes of rural schools in Roi-Et province.
- The randomization was done twice after each in-class training session.
 - There were 65 schools based on class size (no smaller than 5 students) that participated in the experiment.
 - The randomization unit is a school.
- The treatment has 29 schools.
 - The program randomly invited to send their early childhood teachers to the on-site training.
 - There were 38 teachers from 28 schools who attended the training.
- The control has 36 schools.

Time-line of the Experiment







- After the randomization and the baseline survey, the research team found that
 There were 2 teachers from 29 schools that had been using the curriculum a few years earlier.
- There were 88 students in treated schools who had baseline assessment after their teachers had completed the On-Site Training.
- Sor the main analysis, we drop all students from those cases.
- The sample includes 866 students and 75 teachers from 70 classrooms in 57 schools (21 treatment and 36 control schools).

Data collection: Baseline and Endline



- School readiness
 - Child Direct Assessment: both baseline and endline
 - Maths (21 tests) and Literacy (14 tests)
 - Teacher QN: Social-emotional skills (endline only)
 - Parent QN: Social-emotional skills (endline only)
- Classroom Quality: School visit records
- Information:
 - Children (both baseline and endline): gender, age, weight, height, student-teacher ratio
 - Children (endline only): special-needs, health status
 - Teachers (endline only): college major (early childhood education or not), college graduate
 - Parents (endline only): wealth, parental absence, caregiver education, number of books, language

Balanced Distributions of Math and Literacy Skills at Baseline





Balance Test using Baseline Data Main Sample



. Regress each variable on the Treatment Dummy T_i : $Y_i = \alpha + \beta T_i + \epsilon_i$ and clustering at the school level

	Treatment		Contr	Control		Estimation Coeff	
	Mean	N	Mean	N	Coeff	P-value	
Cognitive pre	49.822	338	47.662	528	2.160	0.494	
Math pre	49.507	338	46.681	528	2.826	0.435	
Literacy pre	50.296	338	49.134	528	1.162	0.666	
age	5.578	338	5.510	528	0.069	0.504	
female	0.497	338	0.491	528	0.007	0.870	
weight	19.321	338	19.358	528	-0.037	0.934	
special needs	0.070	315	0.068	502	0.002	0.943	
wealth factor	-0.073	280	0.001	468	-0.074	0.454	
hh size	5.626	270	5.875	424	-0.249	0.145	
care. edu (college)	0.050	278	0.052	445	-0.001	0.948	
care. edu (high sch.)	0.201	278	0.207	445	-0.005	0.854	
Thai at home	0.154	279	0.131	467	0.024	0.609	
Thai at school	0.940	318	0.865	489	0.075	0.245	
height	111.364	338	110.765	528	0.599	0.379	
stu-teacher ratio	15.130	27	13.430	43	1.699	0.293	
teacher age	38.444	27	41.616	43	-3.172	0.304	
frac. of BA	0.981	27	0.872	43	0.109**	0.030	
frac. of inclass	0.944	27	0.779	43	0.165**	0.021	
frac. of ECE	0.759	27	0.733	43	0.027	0.798	

School Days: Time between the Tests



Problem: the number of school days between the tests for treatment and control groups are different





Need to control for school days between the tests

Solution:

- Benchmark Model: using daily learning gains as the main outcomes
 - Weakness: can apply to outcomes that are available from both baseline and endline only
- Robustness: using the endline scores as the outcomes and controlling for school days and the baseline skills (standard approach)



Intent-to-Treat Effect (ITT) of the On-Site Training intervention is estimated using the following specifications with daily learning gains as the outcomes:

$$\frac{\theta_{i1}^s - \theta_{i0}^s}{\tau_i} = \alpha^s + \beta^s T_i + \gamma^s \mathbf{X}_i + \varepsilon_i^s,$$
(1)

where

- θ_{i0}^s and θ_{i1}^s denote test scores for skill s of student i at the baseline and the endline, respectively,
- tau_i is the number of school days between the baseline and endline tests, excluding the days that treated teachers were participating in the on-site training,
- T_i is the treatment dummy variable indicating whether student i attended a treatment school during the experiment,
- X_i is a vector of control variables, and
- ε_i^s is an error term.
- All estimations are clustered at the school level

Benchmark Results: Intent-to-Treat Effect (ITT)



Treatment (On-Site Training) significantly raises daily learning gains in the overall cognitive domain and also both maths and literacy

	COG	COG	MATH	MATH	LIT	LIT
Treat	0.0664***	0.0804***	0.0578**	0.0775***	0.0795***	0.0848***
	(0.0208)	(0.0202)	(0.0221)	(0.0246)	(0.0256)	(0.0268)
N	866	552	866	552	866	552
Control	X^1	X^2	X^1	X^2	X^1	X^2

- **Q** X^1 includes age, age squared, child gender, child weight, child height, student-teacher ratio, the fraction of teachers who attended the in-class training, and grade level.
- X^2 includes all variables in X^1 and more teacher and household characteristics, including a special-need child dummy, main language at school, average teacher age, a fraction of teacher with a bachelor degree or above, a fraction of teacher with an ECE degree, living in the urban area, wealth, household size, main caregiver's education, main language at home, and days adults read to the child.

Intent-to-Treat Effect (ITT): Estimation Results with Interpretation



- Relative to the mean daily learning gains of the control group:
 - \blacksquare The intervention can improve Cognition by 49 %
 - \blacksquare The intervention can improve Maths by 39 %
 - \blacksquare The intervention can improve Literacy by 69 %



Accounting for Non-Compliance: Specification



Non-compliance issues:

- Some teachers attended the on-site training but were assigned to teach in other classrooms or school
- Some teachers in treated classrooms did not attend the on-site training
- Solution A_i as the fraction of treated teachers who complied with the experiment (equals to zero for all control groups)
- $\textcircled{\sc l}$ We account for non-compliance using the following specification using T_i as the instrument for A_i

$$\frac{\theta_{i1}^s - \theta_{i0}^s}{\tau_i} = \alpha^s + \beta^s A_i + \boldsymbol{\gamma}^s \boldsymbol{X}_i + \varepsilon_i^s,$$
(2)



Treatment on the Treated (TOT) effects are slightly larger than the intent to treat effect (from 0.0664 to 0.0748) since the compliance rate is very high

Control	X^1	X^2	X^1	X^2	X^1	X^2
F-Stat	252.9	253.5	252.9	253.5	252.9	253.5
N	866	552	866	552	866	552
	(0.0260)	(0.0254)	(0.0268)	(0.0301)	(0.0315)	(0.0313)
Compliance	0.0748*	** 0.0910***	0.0650**	0.0877***	0.0895**	** 0.0960* ^{**}
	COG	COG	MATH	MATH	LIT	LIT



- The intervention has no significant impact on daily gains in weight and height.
- This indicates that it is likely that the above results are not spurious since the training has nothing to do with nutrition, potentially affecting weight and height.

	Weight	Weight	Height	Height
Treat	0.0340	-0.00967	-0.00499	-0.102
	(0.278)	(0.328)	(0.435)	(0.426)
N	866	552	866	552
Control	X^1	X^2	X^1	X^2

Teaching Quality: Impact of the Intervention



Solution We estimated the intent-to-treat effects (ITT) of the on-site teacher training on learning quality: $Q_j = \alpha + \beta T_j + \gamma Z_j + \varepsilon_j$,

	PDR	Overall	Interac.	Supp.	Prep.	Envi.	Manage.	
Panel A: For the Baseline Indices								
Treat	-0.135	-0.114	-0.0811	-0.252	-0.0984	-0.0752	-0.0465	
	(0.205)	(0.302)	(0.246)	(0.237)	(0.230)	(0.279)	(0.287)	
Ν	69	69	70	70	70	70	70	
Panel	Panel B: For the Endline Indices							
Treat	0.877**	** 0.522 **	0.283	0.271	0.278	0.278	0.240	
	(0.287)	(0.211)	(0.209)	(0.210)	(0.333)	(0.226)	(0.252)	
N	69	69	68	68	68	69	69	

Cost-Effective of the Intervention



The marginal cost related directly to the on-site training was 495 USD per teacher and 32.7 USD per student.

- The training fee in 2020 was 15,000 Thai Baht, and the average exchange between Thai Baht and USD (over 2020) was 30.29 Thai Baht per USD.
- Given that the average student-teacher ratio of the treatment group was 15.13, the average cost per student was about 32.7 USD.
- This excludes costs of other activities, e.g., in-class training, school visits, overhead, and data collection, since the control and treatment share them equally.
- The estimated total impact of one year of the intervention would be about 0.60 SD per academic year,
 - This comparable to Chujan and Kilenthong (2021) was roughly 0.40 standard deviation (over eight months), but it was significantly more costly, with 286 USD per student.
 - This is larger than the effect size of 0.17 SD in Andrew et al. (2022), which was 47 USD per student.



- The intervention, On-Site Training with a specific focus, can help improve students' school readiness significantly:
 - The intervention can improve Cognition by 49 %
- Most likely mechanisms:
 - The On-Site Training improved PDR quality and overall classroom quality significantly.
- The on-site training intervention is cost-effective, costing 32.7 USD per student.