Entrepreneurial Mindsets at Scale: Evidence from a Curriculum Expansion in India

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September 15, 2024
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The evolving nature of the modern labor market has a growing need for an entrepreneurial mindset that encompasses a range of cognitive and non-cognitive skills. Yet, how those skills are acquired by youth is a major challenge in contexts with low human capital. We test the causal impact of a novel entrepreneurial skills curriculum through a large-scale experiment. The program consists of a special curriculum, which is delivered to over 300,000 students over the course of the academic year in the state of Andhra Pradesh, India. After one year of exposure, we find that treated students score 0.03 to 0.15 SD higher in agency over goals and other personal initiative skills. We find an increase in career agency for boys and educational agency for girls. Both males and females are more likely to develop more equitable gender norms. Females improve their financial skills, and are more likely to aspire to have a career that does not involve self-employment. Both males and females improve test scores in English while for females test scores for Maths improve by 0.17 SD. These findings underscore the potential of low-cost school-run programs aiming to bring youth, and girls particularly, into the demands of the modern labor market. We discuss the implications for at-scale interventions.

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We thank YRISE and the World Bank for generous research support. Khizer Asad, Minda Belete, Sanskruthi Kalyankar, Pratik Purohit, Gorthi Shanmukha Vishnu provided excellent research assistance. IRB: Johns Hopkins, NYU Abu Dhabi, and DAI Research.

Keywords: Entrepreneurial skills, adolescents, gender gaps, non-cognitive skills, scale

1 Introduction

With the rapidly evolving nature of work and a constant need for innovation, the skills required for employment are quickly changing. Employers are increasingly looking for workers who have a set of skills associated with entrepreneurship in addition to the core technical skills required for the job. The changing landscape requires a large number of workers to have an entrepreneurial mindset that includes a mix of cognitive and non-cognitive skills (such as critical thinking, creativity, communication skills, grit, self-reliance, etc.) However, while there is high demand for workers with an entrepreneurial mindset, the challenge remains on how to educate today's youth in these skills to make them ready for the "jobs of the tomorrow".

We study a program implemented by the Government of Andhra Pradesh (GoAP) – the Entrepreneurial Mindset Development Program (EMDP). EMDP was rolled out in the Government schools of the state from the Academic Year (AY) 2022-23 onwards. The program includes 50 hours of Entrepreneurial Mindset Curriculum (EMC) delivered to grade 9 students across 220 working days during the regular school hours in the AY 2022-23. For the evaluation, some schools are randomly allocated to receive the curriculum extension after the conclusion of the evaluation. The research questions we aim to address are:

1. Does EMDP improve students' entrepreneurial mindset skills, and educational performance in the short-run?

2. Does EMDP alter students' entrepreneurial behavior and broaden their horizons?

The results of this study generate new evidence for the literature on skills training programs and entrepreneurship. Beyond the scientific contribution, the results are important for policy and implementation purposes. The results of the study support the government

and other funding agencies by demonstrating a proof of concept regarding the effectiveness of entrepreneurial skills training programs.

Our results speak to important questions regarding at-scale interventions. We are able to identify what features make it possible to implement high-quality interventions at scale, by examining the heterogeneity in impacts by teacher and school characteristics. We further isolate the general equilibrium effects on the market for education, by studying how school choices changes in response to a popular program in public schools. Finally, we speak to the aggregate implications for the local economy down-the-line, as these students join the labor market with enhanced clarity on their career paths. We build on the heterogeneity in career choices by local economic characteristics to identify how such a program would enhance the aggregate productivity of the state, as a whole.

2 Experimental design

2.1 Implementing Partner

The Global Alliance for Mass Entrepreneurship (GAME) developed the EMDP curriculum in collaboration with NGOs such as the Udhyam Learning Foundation[1], Aflatoun International[2], Reap Benefit[3], and Makerghat[4]. This curriculum focuses on key skills like communication, collaboration, critical thinking, and creativity, which are essential for future workforce integration and are designed to enhance these transferable abilities.

In partnership with the Government of Andhra Pradesh, EMDP was rolled out by the State Council of Educational Research and Training (SCERT-AP) and Udhyam for Grade 9 students during the 2022-23 Academic Year across 4,776 government schools and approximately 300,000 students.

[1] Udhyam Learning Foundation
[2] Aflatoun International
[3] Reap Benefit
[4] Makerghat

2.2 Intervention

The program features a unique curriculum aimed at equipping Grade 9 students with entrepreneurial skills and mindsets. Delivered throughout the academic year, it engaged students with real-life scenarios to prepare them for various professional environments, including corporations, startups, or family businesses. The curriculum includes daily instructional classes and a substantial practical component, encompassing three smaller projects and one major project. These projects enable students to apply their classroom-learned skills to solve real-world challenges within their communities.

The curriculum includes 18 modules that cover some of the following topics: perseverance, problem identification, solution creativity, growth mindset, communication, critical thinking, and grit. Each module has goals such as promoting curiosity, learning by doing, acceptance of failures, risk assessment, and building a learning community. These skills are ever more important and a growing strand of research suggests these are important for human capital accumulation among adolescents (CITE PAPER FROM LAC), and also for personal initiative skills that raise profits (TOGO PAPER).

Spanning the 2022-23 academic year (August 2022 - March 2023), the intervention included a maximum of 50 hours of EMDP classes, not accounting for the additional time students allocated to project work. EMDP classes, each lasting 90 minutes, took place during the 7th and 8th periods every Friday for all Grade 9 students.

Along with regular classes on Friday afternoons, all students were encouraged to develop and submit their main project for the EMDP EXPO organized in March 2023. Students were expected to develop solutions to problems they identified in their community. Projects were subject to a rigorous evaluation process by teachers and district committees. Ultimately, the best projects from each district were displayed at the expo.[5]

EMDP used a cascade training model for program teachers who delivered the intervention. A select group of skilled and experienced teachers received initial training on the

[5]In Appendix we provide a brief description of the events at the expo and a link to some of the examples of projects presented by EMDP students.

EMDP curriculum from each sub-district[6] ('Master Trainers'). Subsequently, the 'Master Trainers' trained EMDP teachers in their subdistrict. The EMDP teachers were existing school teachers who were nominated by the school principal to teach the EMDP program.

2.3 Randomization & Data

The GAME consortium, our implementing partner, along with the research team, has selected 125 subdistricts in the state, which has 1253 government schools that participated in the study. The EMDP was implemented in 75 subdistricts, and the remaining 50 subdistricts did not receive the program.

Randomization: The randomization was done using the Unified District Information System for Education Plus (UDISE and UDISE+) data. Randomization was done prior to the start of the academic year, and therefore the intervention start. UDISE is one of the largest Management Information Systems initiated by the Department of School Education and Literacy, Ministry of Education, Government of India, covering more than 1.5 million schools, 9.5 million teachers, and 265 million children. UDISE+ is an updated version of UDISE that was in use from 2005-2017. The entire system of UDISE+ is online and has been collecting data in real-time since 2018-19.[7]

Using the UDISE+ 2021-22 data, we randomly sampled 125 subdistricts after dropping those that were part of the pilot study conducted by our implementing partner.[8]. Further, from the 125 selected subdistricts, we randomly sampled 75 that formed the treatment group, and the remaining 50 formed the control group. All the 748 government schools in the treated subdistricts are part of the treatment group, and none of the 505 government

[6] A subdistrict is an administrative area which is also referred to as mandal or block in the state of Andhra Pradesh.

[7] UDISE+ has a mandate of collecting information from all recognized schools imparting formal education from pre-primary to grade 12. Information collected through the digital platform UDISE+ is utilized for planning, optimizing resource allocation, and implementing various education-related programs, and assessing progress. UDISE+ provides a platform to organize and classify all school data across the country and build a credible database of school data. It monitors, measures, and keeps track of vital school performance indicators.

[8] Our implementing partner, GAME, conducted a pilot study in 49 subdistricts.

schools in the control subdistricts received the treatment. Figure 1 displays the geographic location of each treatment and control subdistrict in the study. On average each subdistrict in the sample has covered 10 schools.

Student Survey: Our data come from two main sources. The first source is the student survey (students' psychometric indices, intent to start a business, business pitch quality, and delivery), and consists of administrative records (students' attendance and test scores). Administrative data was collected for the entire population of students who were in Grade 9 in AY 2022-23. For the student survey data, the total number of students per school is 30, and there are 1250 schools. As a result, our sample at the student level is 37,500 students. For the pitch, we randomly choose around 30% of the students per school.[9] We collected data using our survey in schools from November to March 2024. Data are collected using Computer-Assisted Personal Interviewing (CAPI) technology. In Appendix we provide a a description of all the key variables of interest.

Administrative data. We collectedadministrative data for all Grade 10 students in treatment and control schools for academic grades in English, and Mathematics as well as their overall grades, number of days attended, and whether the student was promoted at the end of the AY. This data was collected for three AYs - (1) the AY preceding the EMDP (that is, AY 2021-22, while the students were in Grade 9) - to serve as a baseline, the AY during which the EMDP was implemented (that is, AY 2022-23, while the students were in Grade 9) and the AY following the EMDP (that is, AY 2023-24, while the students are in Grade 10). These data are based on promotion lists, which are sent to the Deputy District Education Office by each school, and we sought the Government's permission to access these data. The administrative records were be matched to the survey data based on students' names, school code and sex (for the subset of students included in the survey).

[9]We also attempted to collect a teacher survey but due to various logistical problems the data is not viable.

2.4 Outcomes

Below we provide a description of the primary, secondary and exploratory outcomes. These were determined based on power calculations and on the theory of change that guided the intervention. In Appendix we provide a description of the power calculations for each measure.

Primary Outcomes: We are primarily focused on two key outcomes. The first pertains to general behavioral traits and the second outcome examines entrepreneurial behavior. While the first outcome is part of the curriculum, the second is to capture effects on entrepreneurial spirit. To form indices, we follow Anderson (2008).

1. *General Behavioral traits:* The program's main aim is to go beyond standard academic education, seeking to trigger various behavioral changes among students. This study focuses primarily on evaluating behavioral traits that are generally associated with success in the labor market: such as aspirations, creativity, collaborative skills, and internal locus of control. Additionally, we are examining broader traits like the Big Five personality traits (agreeableness, conscientiousness, extraversion, neuroticism, and openness), which have relevance in a wider context beyond entrepreneurship. These behavioral traits are our main outcomes, and their scales are provided in the appendix. These traits include Aspirations (academic); Locus of Control (Internal and External); Collaboration (Relationship and Team work); Agency (relating to education, personal and career); and Goal Setting.

2. *Enterprenuerial Behavior:* General traits as discussed above are equally important for an entrepreneurial mindset but additional traits commonly observed in entrepreneurs are also important. For example, entrepreneurs are often recognized for their risk-taking nature, their self-perceived ability, and aspirations to start a business. Within the entrepreneurial behavioral traits, we encompass a collection of five specific outcomes closely linked to entrepreneurs. These include Business Aspirations; Self-

Perceived Business Ability; Business Mathematics Skills; Risk-Taking; and Patience. While the former three are evaluated through survey questions, the latter two are assessed using experimental games. These five traits are pivotal indicators associated with a business-oriented mindset, collectively categorized as our primary outcomes.

Secondary Outcomes. As secondary outcomes, we utilize the rich audio and written material from the action-based task. In a non-traditional "entrepreneurial challenge", students are asked to prepare and deliver a pitch. Our assessment of this task includes outcomes evaluated by both the audio recordings and written material of these pitches. Through this exercise, our primary focus is to determine if students proactively prepared and accurately recorded the pitch as per instructions. The main outcomes for this task encompass task completion; time allocated for preparation; time utilized for recording; and the duration (in seconds) of silence during the recording when the student is not speaking. Beyond the fundamental metrics of task completion, we also evaluate students' proficiency in generating ideas within an entrepreneurial context, their confidence levels, presentation skills, and the overall quality of their pitches. External and independent evaluators score students on the quality of pitches. Any pitch recording that is inaudible or cannot be heard clearly are excluded from our analysis.

Additionally, we gather administrative data encompassing academic performance in class 8, class 9, and 10, alongside school attendance records. This data provides valuable supplementary insights into whether students' achievements and their attendance patterns are not impacted negatively.

Control variables. We include the battery of control variables for demographics, parental background; prior experience with entrepreneurship through family or wider network affiliation. We also include location and geographic variables. For precision, we also include school-level controls such as teacher/pupil ratio and amenities (see Tables 1-3 in the Appendix).

3 Estimation Strategy

3.1 Main Estimation Equation

We use a randomized control trial (RCT) to identify the intervention's causal impact on our outcomes of interest. The main identifying assumption is that had there been no intervention, our outcomes of interest would be, on average, statistically similar between students from the treatment and control groups.

We test for balance in baseline characteristics and find that, on average, there is balance on most characteristics including school infrastructure, parental education, and other socio-economic factors.

To analyze the effects of the intervention, we estimate the intervention's impact by comparing the post-treatment means between treatment and control individuals for our outcomes of interest. We use a linear regression model estimated by Ordinary Least Squares (OLS). Our basic model is given by equation 1 at the student level i:

$$Y_i = \alpha + \delta D_i + \sum_j \beta_j X_{ji} + \epsilon_i^m \,, \tag{1}$$

where δ represents our coefficient of interest (the Intent-to-Treat (ITT)), and D_i is an indicator function that takes the value 1 if the student has received the intervention and zero otherwise. Y_i represents an outcome from our set of primary, and secondary outcomes defined in Section 2.4. X_{ji} is a vector of j covariates at the individual student level or at the school level (see Section 2.4). Our identification strategy does not require including covariates X_{ji} since we achieve balance using a variety of baseline characteristics. However, we plan to test for coefficient stability as we include covariates, increase our estimates' precision, and further enhance the validity of our empirical strategy (explicitly controlling for potential confounders). We plan to discuss the results' robustness to changes in the set of covariates. Since the randomization was done at the subdistrict level, we cluster them by subdistrict.

3.2 Heterogeneity

We test for heterogeneous treatment effects along a series of dimensions. These include gender, along parents' characteristics, including parental education levels, and occupation (whether they own businesses). Third, we test for heterogeneity based on school and district characteristics, including the strength of the local labor market. These heterogeneity help inform the mechanisms and causal pathways. For instance, we may expect to find larger effect sizes when a parent owns their business, or if the local labor market is strong.

Our specification with heterogeneity is:

$$Y_i = \lambda + \delta' D_i + \gamma(D_i \times Z_i) + \beta_z Z_i + \sum_j \beta_j' X_{ji} + \epsilon_i^m \ , \tag{2}$$

where Z_i is the dimension of heterogeneity we test, and γ is the coefficient of interest when we expect heterogeneous treatment effects.

3.3 Multiple Outcomes and Multiple Hypothesis Testing

We employ two different strategies to deal with the rich set of outcome measures. First, we group the related outcome measures into an index as per the definition of each outcome described in Section 2.3. Second, to correct for multiple hypotheses testing, we use a step-down procedure to adjust p-values for the false discovery rate (FDR) among groups of outcomes and report the resulting "q-values" (**?**). We adjust for multiple hypothesis testing within primary outcomes and within secondary outcome groups, but not across them.

4 Results

We present our results on three broad categories of outcomes — (i) general behavioral traits, (ii) entrepreneurial behavior, and (iii) academic outcomes and labor market aspirations. In each of the tables, we estimate treatment effects of EMDP following equation

1. Furthermore, for each outcome, we present three separate panels— the first capturing overall treatment effects, and the second and third capturing treatment effects for females and males respectively as pre-specified. EMDP involved classes aimed at targetting personal skills and aspirations. This was done through a novel pedagogy that invoved extensive opportunity for students to work in groups, communicate, and get involved in the school and out-of-school community. For this reason, the program could have had different effects on females and and males. Females could have benefited more from EMDP since they tend be less empowered. We thus analyze the effects of the intervention separately for females and males.

We begin by presenting the treatment effects of EMDP on various behavioral traits in Table 1. In panel A, columns 1 through 3, we focus on whether the student had agency regarding their education, career, and personal goals. These questions were asked on a scale of 1 (strongly disagree) to 5 (strongly agree). We define indicators for whether an individual had agency across categories if they strongly agreed (responded with 5) with the statement. We find positive and statistically significant effects on agency for education (2.2%), career (3.3%), and goals (2.8%) for students in treatment mandals relative to control mandals. These coefficients translate to an increase of 0.057 sd (agency over education), 0.098 sd (agency over career), and 0.079 sd (agency over personal goals) for treated students relative to the control group. In panel B, we restrict our attention to female students across treated and control mandals. We find that there was a positive and statistically significant treatment effect on agency regarding education, career, and personal goals for female students in treated mandals relative to control mandals. Focusing on male students in panel C, we find similar positive and statistically significant treatment effects on agency across categories. Next, in columns 4 and 5, we focus on aspirations for education and career respectively. In panel A (all students), we find statistically insignificant effects on aspirations for education (column 4), and aspirations for career (conventional p-value 0.076). However, we find that education aspirations increase for females (4.9%), but not for males. There is a similar increase for career aspirations for both females and males, albeit marginally statistically significant for males. Finally, in columns 6 through 8, we focus on locus of control, collaboration, and goal setting. For each of these outcomes, we

Table 1: **Effect of Treatment on Behavioral Traits**

Outcome	Agency (Education)	Agency (Career)	Agency (Goals)	Aspiration (Education)	Aspiration (Career)	Locus Control	Collaboration	Goal Setting
Panel A: All								
Treatment	0.022**	0.033***	0.028***	0.030	0.015*	0.014	0.008	0.014
s.e	(0.009)	(0.009)	(0.009)	(0.019)	(0.009)	(0.024)	(0.011)	(0.014)
FDR q-val	[0.043]	[0.003]	[0.010]	[0.131]	[0.106]	[0.274]	[0.237]	[0.227]
Effect-Size	.057	.098	.079	.061	.045	.019	.021	.029
R-2	0.001	0.002	0.001	0.001	0.001	0.000	0.000	0.000
N	31716	31716	31716	31716	31716	31716	31716	31716
Mandals	125	125	125	125	125	125	125	125
Panel B: Female								
Treatment	0.021**	0.038***	0.028***	0.049**	0.014	0.036	0.018	0.010
s.e	(0.010)	(0.010)	(0.010)	(0.020)	(0.011)	(0.023)	(0.011)	(0.015)
FDR q-val	[0.052]	[0.001]	[0.024]	[0.032]	[0.130]	[0.087]	[0.087]	[0.190]
Effect-Size	.055	.114	.081	.1	.041	.052	.046	.02
R-2	0.001	0.003	0.001	0.003	0.000	0.001	0.000	0.000
N	18128	18128	18128	18128	18128	18128	18128	18128
Mandals	125	125	125	125	125	125	125	125
Panel C: Male								
Treatment	0.023**	0.026**	0.027***	0.004	0.016*	-0.015	-0.005	0.019
s.e	(0.012)	(0.011)	(0.010)	(0.021)	(0.008)	(0.033)	(0.014)	(0.016)
FDR q-val	[0.083]	[0.075]	[0.075]	[0.670]	[0.083]	[0.670]	[0.670]	[0.251]
Effect-Size	.062	.077	.077	.008	.051	-.019	-.012	.039
R-2	0.001	0.001	0.001	0.000	0.001	0.000	0.000	0.000
N	13588	13588	13588	13588	13588	13588	13588	13588
Mandals	125	125	125	125	125	125	125	125

Notes: The table reports ordinary least square estimations at the student level for the treatment. Standard errors (clustered by mandal) are given in parentheses and p-values in square brackets. The main explanatory variable is a dummy for whether the mandal received treatment. The dependent variables are behavioral traits for the endline.

create indicators for whether students strongly agree to a set of questions. Across panels A, B, C, we do not find any statistically significant treatment effects of EMDP in treatment relative to control mandals. Taken together, we find that EMDP had positive treatment effects on agency regarding education, career, and goals, which was driven by positive effects on both males and females. Education aspirations improved for females, whereas career aspirations improved for males.

Table 2: **Effect of Treatment on Skills**

Outcome	**Math-Skill (Interest)**	**Math-Skill (Compound)**	**Math-Skill (Profit)**	**Math-Skill (Return)**	**Business-Skills**	**Risk-Taking**	**Patience**
Panel A: All							
Treatment	0.041**	0.024	0.029*	0.023	0.002	0.173***	0.011
s.e	(0.016)	(0.016)	(0.016)	(0.018)	(0.003)	(0.060)	(0.013)
FDR q-val	[0.041]	[0.189]	[0.129]	[0.195]	[0.381]	[0.036]	[0.294]
Effect-Size	.082	.048	.061	.045	.009	.116	.028
R-2	0.002	0.001	0.001	0.000	0.000	0.003	0.000
N	31716	31716	31716	31716	31716	31716	21575
Mandals	125	125	125	125	125	125	125
Panel B: Female							
Treatment	0.063***	0.028	0.035*	0.040**	0.004	0.175**	0.020
s.e	(0.018)	(0.018)	(0.018)	(0.019)	(0.005)	(0.067)	(0.014)
FDR q-val	[0.007]	[0.102]	[0.073]	[0.070]	[0.192]	[0.033]	[0.105]
Effect-Size	.125	.057	.074	.081	.022	.117	.054
R-2	0.004	0.001	0.001	0.002	0.000	0.003	0.001
N	18128	18128	18128	18128	18128	18128	12398
Mandals	125	125	125	125	125	125	125
Panel C: Male							
Treatment	0.012	0.017	0.021	-0.001	-0.002	0.171**	-0.001
s.e	(0.018)	(0.017)	(0.019)	(0.019)	(0.004)	(0.066)	(0.016)
FDR q-val	[1.000]	[1.000]	[1.000]	[1.000]	[1.000]	[0.077]	[1.000]
Effect-Size	.024	.035	.045	-.003	-.009	.116	-.002
R-2	0.000	0.000	0.000	0.000	0.000	0.003	0.000
N	13588	13588	13588	13588	13588	13588	9177
Mandals	125	125	125	125	125	125	125

Notes: The table reports ordinary least square estimations at the student level for the treatment. Standard errors (clustered by mandal) are given in parentheses and p-values in square brackets. The main explanatory variable is a dummy for whether the mandal received treatment. The dependent variables are math, business and enterpreneurial skills for the endline.

Next, in Table 2, we consider whether EMDP had an effect on skills related to entrepreneurship. In columns 1 through 4, we consider four financial/ math skills from our

survey related to — simple interest calculations, compound interest calculations, profit calculations, rate of return calculations. In column 1, we find that EMDP treated students were 4.1% (panel A) more likely to answer the simple interest question correctly relative to the control group students. Interestingly, these overall effects were completely driven by females. Treated females (panel B) were 6.3% more likely than control females to correctly answer these questions. There were no such differences between treated and control males. In column 2, across panels, we find no statistically significant treatment effects for compound interest calculations. For profit calculations (column 3), we find a marginally significant overall treatment effect, that was driven by females. Finally, for rate of return calculations in column 4, we find no overall treatment effects (panel A) and no treatment effects for males. Treated females (panel B), however, were 4% more likely to correctly calculate rate of returns compared to control females. In column 5, we ask students if they had any business related skills, and find no statistically significant treatment effects across panels. In column 6, we focus on attitudes towards risk. We find statistically significant overall treatment effects (17.3%) in panel A. We find similar treatment effects for both females and males in panels B and C. Finally, we do not find evidence of changes in patience. Overall we find that EMDP improved skills with respect to maths, but these improvements were driven by positive effects on treated female students.

Students attending EMDP classes improved on their behavioral and skills that are deemed necessary for the modern labor market. Do these newly acquired behaviours and skills translate into better grades and aspirations? We look at the effects of EMDP on academic test scores, and labor market aspirations in table 3. We test the effects of EMDP using of administrative data for grade 9 for English and Math test scores in columns 1 and 2. Note that these test scores are from examinations after the conclusion of the EMDP. In columns 1 and 2, we find a positive and statistically significant effect of EMDP on both English and Math test scores. On average treated students had a 1.44 point and 2.47 points higher scores in English and math respectively relative to control students. These scores translated into a 0.087 sd and 0.128 sd higher English and math scores for treated students relative to the control group. These overall effects were driven by statistically significant treatment effects on females (panel B), but not for males. In panel B, we find that English

Table 3: **Effect of Treatment on Academic Outcomes and Labor Choices**

Outcome	Scores (English)	Scores (Math)	Know-Career	Any-Work (Salaried)	Government-Work (Salaried)	Non-Government (Salaried)	Business (Self+Family)
Panel A: All							
Treatment	1.436*	2.472**	0.014*	0.029*	0.042**	-0.026**	-0.002
s.e	(0.822)	(1.177)	(0.007)	(0.017)	(0.020)	(0.012)	(0.017)
FDR q-val	[0.111]	[0.111]	[0.111]	[0.111]	[0.111]	[0.111]	[0.153]
Effect-Size	.087	.128	.046	.063	.083	-.059	-.003
R-2	0.002	0.004	0.001	0.001	0.002	0.001	0.000
N	21723	21363	31716	31716	31716	31716	31716
Mandals	125	125	125	125	125	125	125
Panel B: Female							
Treatment	1.591*	3.035**	0.015	0.032	0.044*	-0.032**	-0.007
s.e	(0.905)	(1.214)	(0.010)	(0.020)	(0.023)	(0.013)	(0.019)
FDR q-val	[0.112]	[0.063]	[0.112]	[0.112]	[0.096]	[0.063]	[0.165]
Effect-Size	.099	.159	.049	.067	.089	-.07	-.013
R-2	0.002	0.006	0.001	0.001	0.002	0.001	0.000
N	12524	12321	18128	18128	18128	18128	18128
Mandals	125	125	125	125	125	125	125
Panel C: Male							
Treatment	1.270	1.764	0.012	0.026	0.038*	-0.019	0.005
s.e	(1.007)	(1.448)	(0.007)	(0.017)	(0.021)	(0.015)	(0.021)
FDR q-val	[0.357]	[0.357]	[0.357]	[0.357]	[0.357]	[0.357]	[0.357]
Effect-Size	.078	.093	.042	.056	.076	-.044	.009
R-2	0.001	0.002	0.000	0.001	0.001	0.000	0.000
N	9199	9042	13588	13588	13588	13588	13588
Mandals	124	124	125	125	125	125	125

Notes: The table reports ordinary least square estimations at the student level for the treatment. Standard errors (clustered by mandal) are given in parentheses and p-values in square brackets. The main explanatory variable is a dummy for whether the mandal received treatment. The dependent variables are labor market choices and academic performance in the endline.

test scores were higher by 1.59 points (0.099sd) and math test scores were higher by 3.035 points (0.159 sd) for treated relative to control females. Next, in columns 3 through 7, we ask students about their future labor market aspirations. We find marginally significant treatment effects for whether students know what they want to do in their careers (column 3), and whether they want to do any salaried work (column 4). For these outcomes, there are no differential effects across males and females. Interestingly, across columns 5 and 6, we find that treated students are 4.2% more likely to report that they want to do a government job and are 2.6% less likely to want to do a non-government job. These effects are mainly driven by females. Finally, in column 7, we find no statistically significant differences across treated and control students on the likelihood of either starting a business or joining their family business (if they had one to begin with). Overall, we find that EMDP treated students had higher math and English test scores. This effect was mainly driven by females. We also find that treated students were more likely to know what they wanted to do in their future career, and want to do a salaried work. However, in terms of work— treated students were more likely to want to do government work and not non-government work, and there was no difference in the likelihood of entrepreneurship (either self or family business).

Finally, since EMDP was delivered through a new pedagogy that required students to work in teams, be more involved in their community, and express themselves in the classroom, we hypothesize that the treatment could have had an impact on gender norms. Females could have gained a better insight of their capabilities and therefore alter their views about women and girls in society. In the same vein, for males, by observing and working along side females in a novel way could have updated their norms in a more progressive manner. In Table **??** we show that both males and females exhibit more progressive norms (0.07 SD). We also find that social desirability bias did not change among treated students, and therefore, measurement concerns associated with this type of bias are unlikely to drive our results.

Table 4: **Effect of Treatment on Gender Roles and Social Desirability**

Outcome	**Gender Roles**	**Social Desirability**
Panel A: All		
Treatment	0.053**	-0.006
s.e	(0.020)	(0.005)
FDR q-val	[0.021]	[0.097]
Effect-Size	.07	-.039
R-2	0.001	0.000
N	31716	31716
Mandals	125	125
Panel B: Female		
Treatment	0.056**	-0.004
s.e	(0.022)	(0.005)
FDR q-val	[0.024]	[0.296]
Effect-Size	.074	-.025
R-2	0.001	0.000
N	18128	18128
Mandals	125	125
Panel C: Male		
Treatment	0.049**	-0.009*
s.e	(0.024)	(0.005)
FDR q-val	[0.066]	[0.066]
Effect-Size	.067	-.055
R-2	0.001	0.001
N	13588	13588
Mandals	125	125

Notes: The table reports ordinary least square estimations at the student level for the treatment. Standard errors (clustered by mandal) are given in parentheses and p-values in square brackets. The main explanatory variable is a dummy for whether the mandal received treatment. The dependent variables are labor market choices and academic performance in the endline.

5 Implications for Scale and Next Steps

The at-scale implementation of this program provides us a unique opportunity to examine a variety of questions related to broad-based programs. In our next steps, we aim to examine a few critical questions related to at-scale programs.

First, on the implementation quality side, we do a deeper dive into the cascade model of training, and what teacher characteristics allow for efficient at-scale interventions. We merge in data on teacher characteristics from the DISE database, and examine heterogeneity in effects by such features.

Second, we examine the general equilibrium consequences on the market for education. The program seemed generally popular with parents, and we can examine whether enrollment in public schools increased (and enrollment in private schools decreased) as a result of this intervention. We further investigate other household changes with the help of family-based surveys down the line.

Finally, we examine the expected impacts on the broader local economy. This includes the impacts on the labor market, entrepreneurship, and various activities that these individuals are involved with. We expect selection into various activities by characteristics of the individual, and of the local economy (here, mandal). As we have information on local economy characteristics for the entire state, we can speak more broadly to the state-wide impacts on the labor market. Indeed, as we show with our preliminary results, most students have more clarity on what they aim to do with their careers, and we expect this to affect aggregate productivity and growth at the state-level. The presence of such an at-scale intervention, provides us the opportunity to build on the heterogeneous impacts by mandal economic charachteristics, to quantify the aggregate consequences in a disciplined manner.

6 Discussion and Conclusion

References

Anderson, M. L. (2008). Multiple inference and gender differences in the effects of early intervention: A reevaluation of the abecedarian, perry preschool, and early training projects. *Journal of the American statistical Association*, 103(484):1481–1495.

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Main Tables

Table 5: Balance Test

	Building Blocks	Classrooms	Toilet	No. of Func. Toilets (Boys)	No. of Func. Toilets (Girls)	Handwash	Drinking Water	Func. Hand Pump
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Treat	0.114	0.215	0.00292	0.0667	0.476	-0.0439	0.00719	0.0527
	(0.44)	(0.22)	(0.35)	(0.13)	(0.69)	(-1.49)	(0.36)	(0.85)
N	1253	1253	1253	1134	1196	1253	1253	1205

Notes: Robust standard errors clustered at subdistrict level in parenthesis. Significance: *p $<$ 0.10, **p $<$ 0.05, ***p $<$ 0.01.

Table 6: Balance Test (Contd.)

	Func. Tap	Water Purifier	Electricity	Library	Playground	Medical Checkup Conducted	Computer Room	Digital Board	Internet Facility
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Treat	0.0101	0.00832	-0.0106	0.00248	0.0428	-0.00910	-0.0530	0.00432	-0.0522
	(0.23)	(0.16)	(-1.08)	(0.07)	(1.43)	(-0.57)	(-1.23)	(0.19)	(-0.83)
N	1205	1241	1253	1253	1253	1253	1250	1253	1253

Notes: Robust standard errors clustered at subdistrict level in parenthesis. Significance: *p $<$ 0.10, **p $<$ 0.05, ***p $<$ 0.01.

Table 7: Balance Test (Contd.)

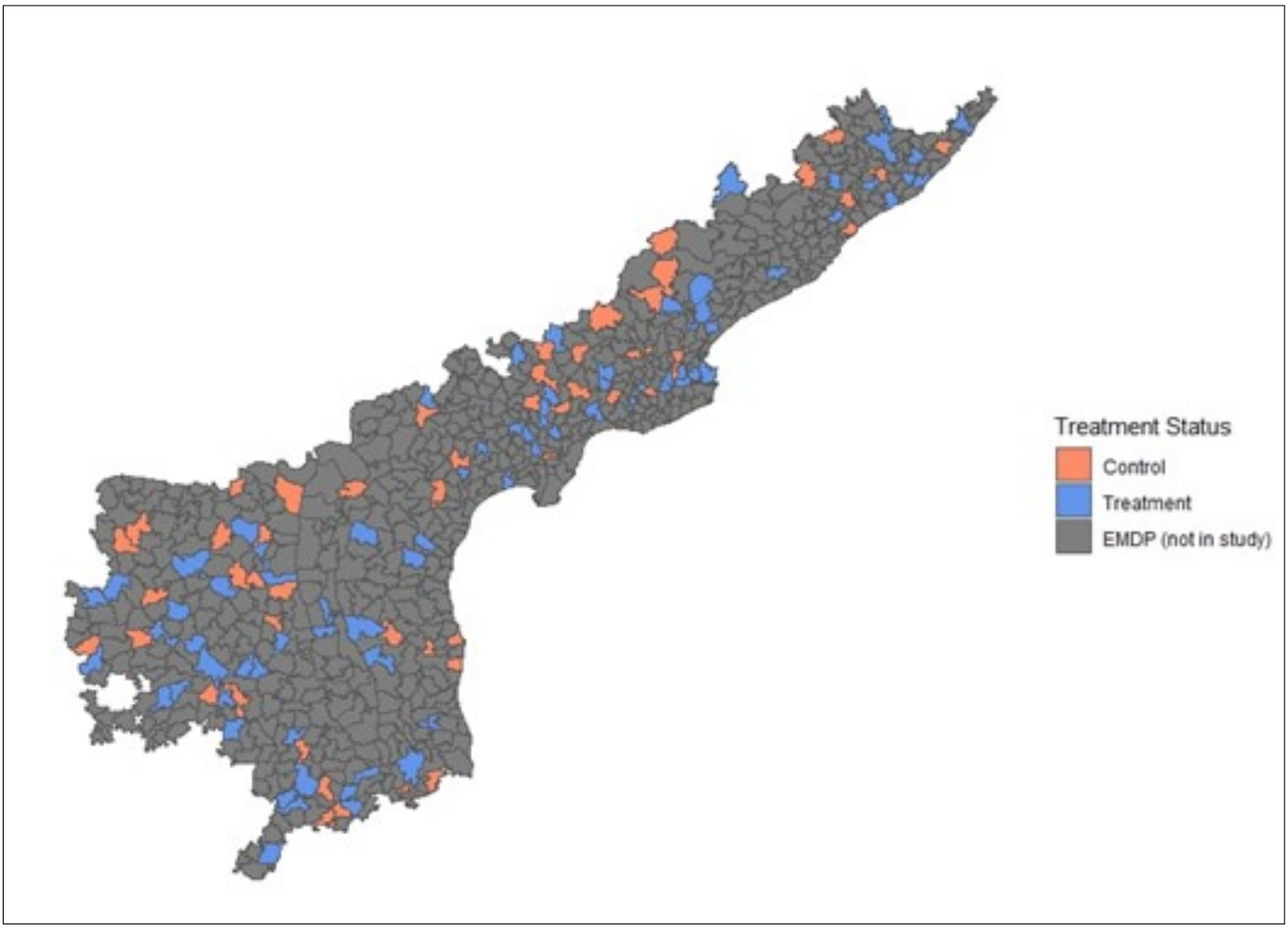
	Missing Student Scores	Prop. Student Scores ≥ 60	Prop. of OBC Students	Prop. of SC Students	Prop. of ST Students	Prop. of Female Teachers
	(1)	(2)	(3)	(4)	(5)	(6)
Treat	0.106	0.0478	-0.0150	-0.00974	-0.0115	0.0128
	(1.54)	(1.33)	(-0.43)	(-0.42)	(-0.33)	(0.51)
N	1167	740	1126	1126	1126	1148

Notes: Robust standard errors clustered at subdistrict level in parenthesis. Significance: *p $<$ 0.10, **p $<$ 0.05, ***p $<$ 0.01.

Online Appendix

September 15, 2024

Figure 1: Implementation Sub-districts of the Entrepreneurial Mindset Development Program



Note: This figure presents the map of sub-districts in the state of Andhra Pradesh. Sub-districts denoted in orange are control areas. Sub-distritcs denoted in blue are treatment areas. Sub-districts denoted in grey are other areas where EMDP was implemented but that were not included in the study.

.1 Ethics

This project received ethics approval from Johns Hopkins University, Homewood Institutional Review board (HIRB00017941); New York University Abu Dhabi (HRPP-2023-157); DAI Research and Advisory Services PVT LTD -IRB (IRB00012768) . Below we provide a detailed description of the process to obtaining consent for the surveys with children. **Parental Consent:** The evaluation of this program relies on endline surveys conducted among students who were in class 9 during the academic year 2022-2023 and have since progressed to class 10 in the academic year 2023-2024. The academic calendar in Andhra Pradesh spans from April to March. Given the age of the students range from 15 to 18 years, the local IRB requires parental consent. We acquire parental consent before collecting data from students. The survey is conducted on the school premises with the permission of the school principal. The risk to students from participating in the survey is no more than minimal.

Through the consent form, we want to assure parents that their child's privacy and safety throughout the survey are of primary importance. All stakeholders, i.e. parents, school head teachers, and students, are informed that the collected data is anonymized and kept private. As part of the survey, we do not seek to collect sensitive information about students or their parents, such as national ID cards (Aadhar card numbers), ration cards, etc. Through the parental consent form, we inform the parents that the data generated during the survey is strictly used for research and academic purposes only. The student's personal information is kept secure and was not be shared with any third party. In the form, parents are also informed that their child might or might not be selected to participate in the survey, and the student can withdraw their participation. Parents are also provided with contact information in case they intend to reach out with concerns or complaints about research-related problems or injuries.

The parent consent form is translated into Telugu (local language). The language of the consent form is adapted to an appropriate reading level using short sentences while utilizing colloquial language.

According to the survey plan, a team of two enumerators visits each school twice. The

first visit is to provide the parental consent form to the school principal and finalize the date for the organization of the survey. The parental consent form is provided to all students in class 10 enrolled in the school. Anticipating the possibility of students misplacing the parental consent form, the delivery of the form, and the survey date are considerably apart, enumerators have been instructed to collaborate with school principals to schedule surveys soon after. Ideally, we have tried to schedule for the next day to ensure prompt completion and minimize the risk of losing the consent form.

During the second visit, the enumerators in advance contact the school principals to verify that they have received the consent forms. The survey is carried out in a school only if more than 80% of the total students in class 10 have returned the signed consent forms. To participate in the survey, only 30 students are randomly picked from the total students. The enumerators are instructed to replace the student if the randomly picked student on the day of the survey does not have a signed parental consent form.

While this procedure applies to most schools, residential schools present a challenge since students live away from home. In such cases, we have planned visits to residential schools to distribute the consent form before a long vacation when the students are most likely to go back home. The survey for these schools was conducted after the vacation period once the students have returned the signed consent forms. At a later point, we plan to move to securing verbal consent from the parents. We do not intend to waive off the gathering of the parental consent form in any context. Toward the end of the survey, the enumerator collects the parent consent form, student consent form, and pitch preparation sheet from each student and stores these physical copies in the assigned folder.

Survey: Key Variables

A. Aspirations: We use two measures: *Academic Aspiration* and *Future Business Aspirations*

Academic Aspiration:

- What is the highest level of schooling you plan to complete?

    1. Class 10
    2. Class 12
    3. Vocational/Technical Training
    4. Polytechnic College
    5. Bachelors Degree
    6. Post graduate Degree

Future Business Aspiration:

- Thinking about yourself in the future immediately after completing your studies, for your first employment do you plan to....

    1. Work for pay for the Government
    2. Work for pay in someone else's company
    3. Work for pay in an NGO
    4. Work on my own business for profit
    5. Work on my family business for profit
    6. Not work
    7. -99 Not sure / Don't know

- Thinking about yourself in the future immediately after completing your studies, do you plan to start a part-time business ....

    1. Yes

2. No

- Thinking about yourself in the future, after gaining a few years of work experience in your first job, do you plan to....

    1. Work for pay for the Government
    2. Work for pay in someone else's company
    3. Work for pay in an NGO
    4. Work on my own business for profit
    5. Work on my family business for profit
    6. Not work
    7. -99 Not sure / Don't know

- Thinking about yourself in the future after gaining a few years of work experience in your first job, do you plan to start a part-time business ....

    1. Yes
    2. No

B. Locus of Control :

We ask whether students strongly disagree, disagree, neither agree nor disagree, agree or strongly agree with the following statements:

1. When I make plans, I am almost certain that I can make them work.
2. Getting people to do the right thing depends upon ability; luck has nothing to do with it.
3. What happens to me is my own doing.
4. Many of the unhappy things in people's lives are partly due to bad luck.
5. Getting a good job depends mainly on being in the right place at the right time.
6. Many times I feel that I have little influence over the things that happen to me.

C. Collaboration :

We ask whether students strongly disagree, disagree, neither agree nor disagree, agree or strongly agree with the following statements referring to how much they value relationships and teamwork:

Valuing Relationships

1. I am a good listener.
2. I enjoy seeing my classmates be successful.
3. I take into account what others are interested in.
4. I enjoy considering different perspectives.

Valuing Teamwork

1. I prefer working as part of a team to working alone.
2. I find that teams make better decisions than individuals.
3. I find that teamwork raises my own efficiency.
4. I enjoy co-operating with peers.

D. Agency :

We ask whether students strongly disagree, disagree, are neutral, agree or strongly agree with the following statements referring to their education, career and personal goals.,

Regarding your education:

On a scale of 1 to 5, how strongly do you agree or disagree that you have the ability to make decisions about your education?

Regarding your career:

On a scale of 1 to 5, how strongly do you agree or disagree that you have the ability to make decisions about your career choices?

Regarding your personal goals:

On a scale of 1 to 5, how strongly do you agree or disagree that you have the ability to set and pursue your personal goals?

E. Goal Setting:

We ask whether students consider the following statements to be not like them at all, not much like them, somewhat like them, mostly like them or very much like them:

1. I often set a goal but later choose to pursue a different one.
2. I have been obsessed with a certain idea or project for a short time but later lost interest.
3. I have difficulty maintaining my focus on projects that take more than a few months to complete.
4. New ideas and projects sometimes distract me from previous ones.
5. I finish whatever I begin.
6. Setbacks don't discourage me.
7. I am diligent.
8. I am a hard worker.

F. Big 5:

To measure the Big 5 Personality Traits, i.e., Agreeableness, Conscientiousness, Extraversion, Neuroticism, and Openness, we ask whether students strongly disagree, disagree, neither agree nor disagree, agree or strongly agree with the following statements.

Agreeableness:

1. You see yourself as someone who tends to find fault with others.
2. You see yourself as someone who has a forgiving nature.
3. You see yourself as someone who is generally trusting.
4. You see yourself as someone who is sometimes rude to others.

Conscientiousness:

1. You see yourself as someone who does things carefully and completely.
2. You see yourself as someone who can be somewhat careless.
3. You see yourself as someone who tends to be disorganized.

4. You see yourself as someone who tends to be lazy.
5. You see yourself as someone who does things efficiently (quickly and correctly).
6. You see yourself as someone who makes plans and sticks to them.

Extraversion:

1. You see yourself as someone who is reserved; and keeps thoughts and feelings to self.
2. You see yourself as someone who generates a lot of enthusiasm.
3. You see yourself as someone who tends to be quiet.
4. You see yourself as someone who is outgoing, sociable.

Neuroticism:

1. You see yourself as someone who is depressed, or gets blue.
2. You see yourself as someone who has an active imagination.
3. You see yourself as someone who likes work that is the same every time (routine).
4. You see yourself as someone who likes to think and play with ideas.
5. You see yourself as someone who doesn't like artistic things (plays, music).

G. Entrepreneurial Behavior: Business Math, Risk, Patience, Business ability

Business Math:

We use the following four questions to evaluate students' grasp of basic business math, e.g., simple interest, compound interest, profit and rate of return.

- Suppose you take a loan of 10000 INR and the interest rate is 5 percent per year. You have to pay back the principal and interest after 1 year. After one year, how much would you have to pay back?

1. 10,000 INR
2. 10,500 INR
3. 15,000 INR

- Suppose you had 10000 INR in a savings account and the interest ratewass 2 percent per year compounded annually. After five years, how much do you think you would have in the account if you left the money to grow?

1. More than 11,000 INR
2. Exactly 11,000 INR
3. Less than 11,000 INR

- Suppose there is a business that sells agar battis. The cost of material and labor to make agar battis is 900 INR. It sells these for 1300 INR at the end of the year. How much profit would this business earn in 1 year?

1. 100 INR
2. 300 INR
3. 400 INR

- Suppose you invest 1000 INR of your own savings in the agar batti business described in the last question. What is the rate of return on this investment?

1. 10 percent
2. 30 percent
3. 40 percent

Risk:

We use a simple experimental game to measure attitudes towards risk. Students are presented with the following scenario and asked which game they would pick:

Suppose you're asked to play a game where a coin is flipped. You get a certain amount of money if it lands heads, and a certain amount of money if it lands tails. There are 5 versions of the game below.

- 1st game: Heads = 2500 INR, Tails = 2500 INR
- 2nd game: Heads = 2000 INR, Tails = 4000 INR

- 3rd game: Heads = 1500 INR, Tails = 5500 INR
- 4th game: Heads = 1000 INR, Tails = 7000 INR
- 5th game: Heads = 0 INR, Tails = 10000 INR

Patience/time preferences:

Another experimental game is used to measure time preferences. Students are presented with the following scenario and asked which game they would pick. The game continues as long as the respondent picks option (1):

People often make decisions that involve trading off something soon for something else later. For example, people sometimes have to choose between having some money soon, or having more money later. The next set of questions asks how you make such decisions. There are no right or wrong answers. For each pair of options please indicate which you prefer between option (1) and option (2). Would you prefer:

- (1) 1000 INR now, or (2) 900 INR in one month?
- (1) 1000 INR now, or (2) 1100 INR in one month?
- (1) 1000 INR now, or (2) 1300 INR in one month?
- (1) 1000 INR now, or (2) 1500 INR in one month?
- (1) 1000 INR now, or (2) 2000 INR in one month?
- (1) 1000 INR now, or (2) 2500 INR in one month?

H. Pitch :

First, students are presented with a business pitch of an individual thinking of starting a business. The content of the pitch (provided below) covers the following dimensions: (1) Introduction (2) Problem Statement (3) Solution (4) Customers/Market Opportunity, and (5) Ask and Conclude.

Pitch:

Introduction: Ladies and gentlemen, I'm [Your Name], and I'm here to introduce an innovative solution to a critical problem in farming. This venture tackles over-irrigation, water waste, and rising costs for farmers. Problem Statement: In our area, farmers often

use too much water for their crops, leading to water wastage. This happens because they sometimes forget to turn off the water pump or think that more water is always better for their crops.

Solution: We're creating a smart irrigation system that takes the guesswork out of watering crops. It uses sensors and technology to check the soil and weather, then waters the crops just the right amount automatically.

Customers/Market Opportunity: This solution is in high demand due to water shortages. We'll target farmers of all sizes and groups. Our system is eco-friendly and affordable, giving us a strong market position.

Ask and Conclude: Your financial support will make a significant impact. Join us to save water, boost crop yield, support sustainable farming and get high monetary returns. Let's revolutionize irrigation together!

Second, students are asked to answer the following question about the pitch:

What problem does the proposed business venture aim to address?

1. Over-fertilization of crops
2. Crop diseases and pests
3. Over-irrigation and water wastage

Third, students are asked to create a coherent business pitch for another business problem (see problem statement below). Students are informed that independent evaluators would vote on the pitches based on the content as well as style of pitching, and that the top three winners would receive prizes of 10,000 INR for the first place, 5,000 INR for the second place, and 2,000 INR for the third place. Students are reminded that the content of the pitch should broadly include: (1) Introduction, (2) Problem Statement, (3) Solution, (4) Customers/Market Opportunity, and (5) Ask and Conclude. The time allocated for this task is 5-minutes for preparation, during which students are provided with a sheet with the five content dimensions and their assigned ID to take notes. The sheets are collected at the end of the survey.

Problem statement: In your region, farmers face significant challenges with tomato crop wastage due to unpredictable bumper production. This leads to financial losses for the farmers and unnecessary waste of valuable resources.

In a fourth and final step, students are asked to record a pitch that is no longer than 2 minutes using the tablets' recording function.

.2 Pre-analysis plan and power calculations

The study was pre-registered in the American Economic Society AEA RCT Registry on January, 8 of 2024 – AEARCTR-0012702. To determine the set of primary, secondary and exploratory outcomes we performed our power calculations based on data collected during the pilot phase of EMDP. We have baseline and endline data from the pilot for different non-cognitive skills such as self-efficacy. The skills were measured using psychometric tests.

We calculate the average difference between the endline and baseline scores of students to estimate a plausible effect size. For self-efficacy, we have the pilot pre and post data for 1,508 students. We find that the average endline self-efficacy score was approximately 0.5 standard deviations higher than the baseline score. We are clustering our randomization at the subdistrict level and find an intra-cluster correlation (rho) of 0.42 in the data from the pilot. Our power calculations indicate that to detect an effect of 0.5 standard deviations, we need at least 16 clusters (subdistricts) per arm assuming we have 50 students per subdistrict for 80% power.

However, previous estimates in related literature have found smaller effects. For instance, a program to improve life skills of adolescent girls in Rajasthan found a 0.1 standard deviation increase in said life skills (Edmonds et al. (2023)). Therefore, we have 75 treatment and 50 control subdistricts.