Effective Training Through a Mobile App

Evidence from a Randomized Field Experiment

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Motivation

Adoption of New Technology and Better Farming Practices Have Challenges

- Farmers in developing countries usually lack access to vital resources and services
- Agricultural extension services are important to overcome these deficiencies (including technical training)
  - Can reduce poverty by providing information and transferring knowledge to farmers (Anderson and Feder 2004, Nakasone et al. 2014)
- However, traditional extension services have high fixed and recurrent financial costs (Quizon et al. 2001, ICRAF 2018)
- These limit their scalability and efficiency

Rapid Expansion of ICTs Offers Great Potential

- ICT-based solutions may be an effective way of knowledge delivery in rural settings
  - Radio, television, computer, mobile phones, etc.
  - May help increase farmers' awareness of best practices
- Mobile phones are one of the fastest-growing and most widespread forms of ICT
- The roll-out of extension programs through ICTs is still in an early stage
- Little research is available regarding such programs' impacts (Nakasone et al. 2014)
  - Voice messages (Cole and Fernando 2021)
  - SMS messages (Fafchamps and Minten 2012, Casaburi et al. 2019)

Research Question

Is Technical Training Through A Mobile App An Effective Method?

- We provide farmers technical training through an easy-to-use mobile application
  - Certain kinds of information may be too complicated to convey by text or voice (Fabregas et al. 2019)
  - Our mobile app addresses this issue by providing information and demonstrations through videos
  - The app records what, when, and how long a farmer watched each video in our app
- We also provided aspirational videos via the same app
  - Aspiration videos may enhance farmers' psychological well-being (Ridley et al. 2020)
  - They could also facilitate or complement learning among farmers (Fabregas et al. 2019)
- We conduct an experiment to examine whether the training improves farmers' knowledge and the quality of their farm product

Study Setting and Intervention

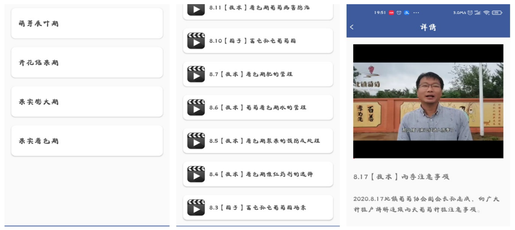
Study Setting

- Our study takes place in the city of Beizhen in Liaoning, China
  - China has the most mobile app downloads in the world
  - Cost of accessing the internet is low and 98% of rural villages have internet coverage
- We partner with the Beizhen government
  - Beizhen is a famous grape town and the largest grape fresh storage base in China
  - The Government is interested in improving the price small grape farmers receive and commissioned Shenyang Agricultural University (SAU) to find ways to improve the grape quality
- SAU developed training modules that would help farmers improve grape sweetness

Intervention

- Technical videos only (T1)
  - A series of videos on grape farming techniques to increase grape quality (1 to 3 minutes in length)
  - Curated to be relevant to the farmers' particular needs at each stage of the grape-growing period
- Technical videos and aspiration videos (T2)
  - T1 videos plus aspirational videos promoting the practice of growing of high-quality grapes
  - Aspiration videos feature established farmers with stories of their successful experience raising the quality of their grapes
- Placebo videos (C)
  - Only videos featuring the local history of the grape industry and natural landscapes of the region
  - Released to all farmers at different points throughout the study period

Mobile App Interface



Empirical Strategy

Intent-to-treat (ITT) effect:

$$y_{iz} = \beta_0 + \beta_1 T1_z + \beta_2 T2_z + X'_{iz}\delta + \varepsilon_{iz}$$

- y_{iz} is the outcome measured at endline for farmer *i* in zu *z*
- $T1_z$ is technical training only arm
- $T2_z$ is technical training and aspiration arm
- X'_{iz} includes baseline characteristics
- Cluster SEs by zu (level of treatment).

Treatment-on-the-treated (TOT) effect :

First Stage: $k_{iz} = \alpha_0 + \alpha_1 D_z + X'_{iz}\lambda + \nu_{iz}$

Second Stage: $y_{iz} = \beta_0 + \beta_1 \hat{k}_{iz} + X'_{iz}\delta + \varepsilon_{iz}$

- k_{iz} is farmer *i*'s score on our test at endline
- $D_z \in \{T1_z, T2_z\}$ is an indicator variable for treatment status for the respective treatment groups
- Estimation of TOT is restricted only to a treatment group and the control group

Results

Table 1: Impact on Test Score

	(1) Standardized Test Score (All 10 questions)	(2) Standardized Test Score (Repeated 5 questions)
Technical videos only (T1)	0.520***	0.371***
	(0.097)	(0.095)
Technical videos and aspiration videos (T2)	0.451***	0.413***
	(0.102)	(0.083)
Observations	687	687
Control-group mean	0.000	0.000
T1=T2 (p-value)	0.492	0.572

Notes: All regressions include test score at baseline. Heteroskedasticity-robust standard errors, clustered by zu, in parentheses.
*** p<0.01 ** p<0.05 * p<0.1

Table 2: TOT Effect on Sweetness

	(1) Sweetness (T1)	(2) Sweetness (T2)
Standardized Test Score	0.554*	0.218
	(0.294)	(0.241)
Observations	467	466
Control-group mean	0.000	0.000

Notes: All outcome variables are standardized with respect to control group. All regressions include self-assessed grape quality at baseline. Heteroskedasticity-robust standard errors, clustered by zu, in parentheses. *** p<0.01 ** p<0.05 * p<0.1

Table 3: Impact on Farmers' Belief on Their Product

	(1) Sweetness	(2) Count	(3) Weight
Technical videos only (T1)	0.474***	0.173*	0.213**
	(0.092)	(0.103)	(0.105)
Technical videos and aspiration videos (T2)	0.510***	0.039	0.149
	(0.086)	(0.093)	(0.106)
Observations	687	687	687
Control-group mean	0.000	0.000	0.000
T1=T2 (p-value)	0.666	0.202	0.576

Notes: All regressions include test score at baseline. Heteroskedasticity-robust standard errors, clustered by zu, in parentheses.
*** p<0.01 ** p<0.05 * p<0.1

Result Summary

Technical training through our mobile app improves knowledge

- Technical test score ↑ 0.52 SDs
- Farmers believe that their grapes are sweeter
  - Sweetness assessment ↑ 0.51 SDs
  - May help increase farmers' awareness of improved practices
- Helps them enhance the quality of their produce
  - Intent-to-treat (ITT): Grape sweetness ↑ 0.30 SDs
  - Treatment-on-the-treated (TOT): Grape sweetness ↑ 0.55 SDs
- Larger effects for higher percentage of videos watched

Take Away

Providing training through apps is an effective delivery method

- Farmers can learn technical skills through a mobile app

It also helps farmers enhance the quality of their produce

- Can be an effective alternative to traditional extension service

Cost of our whole experiment, including developing the app and watch bonuses

- Technical videos only: $27.5 per farmer
- Technical videos and aspiration videos: $31.7 per farmer
- Average cost diminishes the longer the farmers use the app

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