



Digitally Enabled Training for Unconnected Farmers



Using Digital Tools to Reach Smallholder Farmers with Limited Access to Communications Technology

December 2021



Table of Contents

Executive Summary	3
I. Introduction	5
II. Recommended Approaches	6
Recommendation 1: Use digital tools to train farmer trainers	6
Recommendation 2: Augment in-person field training with tools like video and audio	9
Recommendation 3: Incorporate appropriate digital tools for remote and blended learning, based on farmers' access to technology	12
III. Factors for Success	18
Sources	20

Table of Figures

Figure 1. Summary of recommended approaches	4
Figure 2. Use digital tools to train farmer trainers	6
Figure 3. The New Remote Model	7
Figure 4. Augment in-person field training with video and audio	9
Figure 5. Program Innovation at TechnoServe	18

Executive Summary

Face-to-face, in-person training by experienced trainers - directly sharing their knowledge and passion - has the power to permanently transform lives for the better. But is there a way to magnify this impact?

By augmenting and complementing the human-to-human model, digital technology can significantly enhance the impact of effective training programs, making them massively scalable. This technology is creating new opportunities for development organizations, governments, and the private sector to provide digital training and advisory services that more effectively support smallholder farmers. Digital technology allows training providers to reach previously unreachable populations, increase impact through more tailored and time-sensitive training, and operate more efficiently.

Some smallholder farmers lack access to even basic communication technology, while many do not have access to the internet, and this has limited efforts to harness digital tools to improve their training. But it is a false and misleading choice to assume that we must either replace effective in-person training with digital training or do nothing at all. Appropriate digital tools augment human in-person training programs. The question we attempt to answer in this report is: *How do we leverage digital tools to improve training and advisory, even for remote, disconnected farmers, to ensure that these women and men are not left out of the opportunities presented by digital transformation?*

This report presents TechnoServe's research and experience implementing digital training and advisory services across Africa, Latin America, and India to provide practical advice about how digital tools can enrich agricultural training, even for unconnected farmers.

It focuses on three recommendations:

Use digital tools to train farmer trainers: Using a strategy that incorporates digital tools to train farmer trainers, such as government extension agents, private trainers, or project staff, can be a highly effective approach. In-person training supplemented by content delivered via a learning management system has been shown to make training-the-trainer initiatives more consistent, empower trainers with continuously updated content and powerful tools, and increase training-program scalability and sustainability. TechnoServe is taking this approach to help farmer trainers in Benin learn and teach the new national standard training material for cashew farming and nursery management practices.

Augment in-person training with video and audio: Incorporating multimedia elements like video and audio into in-person training has been demonstrated to improve learning and adoption among farmers, create spillover effects among farmers who don't receive training, and make the jobs of field teams easier. TechnoServe's Business Women Connect program has integrated video into its training in Nigeria, making it easier for the program's women farmers to access and act upon agricultural information.

Incorporate appropriate digital tools for remote and blended learning, based on farmers' access to technology: While many smallholder farmers lack access to mobile internet, a number do have access to basic feature phones and radios. SMS messages, interactive voice messages, and radio programming can effectively complement training when they are integrated with other approaches and are designed with interactivity in mind. That is the case with TechnoServe's MOCCA program, in which radio, SMS, digital attachments, videos, and audio supplement in-person training to reinforce best practices and stimulate behavior change among coffee farmers in Latin America.

In implementing these recommendations, it is important for organizations to follow best practices for digital enablement, including the use of human-centered design and a lean build-measure-learn development process. Teams must focus on high-quality content, appropriate pedagogy, the inclusion of behavioral nudges, and finally, the selection of the best-suited technology for the specific user profile.

Figure 1. Summary of recommended approaches

RECOMMENDATION 1: Use Digital Tools to Train Farmer Trainers

WHAT IT IS	WORKS BEST WHEN...	KEY BENEFITS
Delivery of training of trainers through blended approach, utilizing an online learning platform in addition to in-person training for trainers, extension agents, cooperatives or other partner organizations.	<ul style="list-style-type: none"> Trainers have access to smartphone, tablet or computer and at minimum, periodic internet or data access Trainers are literate 	<ul style="list-style-type: none"> Makes programs sustainable and scalable, with easy hand off to governments or successor organizations Reduces training cost and improves training effectiveness, e.g. by enabling trainer certification Builds a consistent, standardized base of training content for trainers via the mobile training platform Allows trainers to refresh their knowledge while in the field

RECOMMENDATION 2: Augment in-Person Field Training with Video and Audio

WHAT IT IS	WORKS BEST WHEN...	KEY BENEFITS
During in-person field training, trainers utilize video (location and device permitting) or pre-recorded audio in the local language, coupled with visual aids.	<ul style="list-style-type: none"> Trainers have tablets, smartphones and/or portable projectors and speakers 	<ul style="list-style-type: none"> Increases farmer engagement Increases learning and practice adoption of good agricultural practices Reinforces learnings demonstrated in the field Generates “spillover effects” or learning to farmers who are *not* trained Expands universe of available trainers Allows trainers to focus on client engagement Provides consistent, standardized training, program-wide Enhances program scalability by increasing farmer reach per trainer

RECOMMENDATION 3: Incorporate Appropriate Digital Tools for Remote and Blended Learning, Based on Farmers’ Access to Technology

WHAT IT IS	WORKS BEST WHEN...	KEY BENEFITS
Supplement in-person farmer training with delivery of training content and follow up communication via a combination of digital tools, including: SMS texts, calls, interactive voice response (IVR) and radio. If clients have access to a smartphone, video may also be used.	<ul style="list-style-type: none"> Farmers have access to some technology, such as radio, TV, or phones (feature or smart) Multiple tools are used in combination to reinforce learnings from in-person training or incentivize best practice adoption Farmers are engaged via two-way communication Messaging is customized and personalized to each individual farmer’s local context and field conditions 	<ul style="list-style-type: none"> Reinforces learnings demonstrated in the field Increases program scalability Increases learning and behavior change Generates high “spillover effects” from radio listeners to non-listeners Increases capability to provide more personalized or tailored advisory

I. Introduction

Digital communications tools have broadened the possibilities for providing training on agricultural and business skills. Many governments, businesses, and civil society organizations have started to employ a range of tools to remotely support those farmers and [\(primarily urban\) entrepreneurs](#) who have access to mobile broadband. These farmers and entrepreneurs are receiving training through an array of apps, video content, and videoconferencing technology, and this process has accelerated with the COVID-19 pandemic.

However, focusing only on those with access to technology represents a missed opportunity to increase the effectiveness and scale of training for the many smallholder farmers who don't have smartphones and reliable internet connections, or even access to basic feature phones and radios.

These unconnected farmers comprise a significant proportion of the population across the global south; indeed, in remote and marginalized areas, they usually form a clear majority. [According to the GSMA](#), about 46% of the population in Sub-Saharan Africa subscribes to some kind of cellular service, but just 28% of the population uses mobile internet. Gender plays an important role in access to this technology: across low and middle-income countries, men are 15% more likely than women to have access to mobile internet, and this gap rises to 37% in Africa.

Among the population, smallholder farmers are also less likely to be connected to the internet. TechnoServe program managers estimate that 88% of the smallholder farmers enrolled in its coffee projects in Latin America and Africa lack reliable access to mobile internet. That percentage rises to 95% for programs focusing on other cash crops, with an estimated 62% of farmers in these programs lacking access to phones of any kind.

These farmers can't reliably access training apps, view videos, or even receive WhatsApp messages. However, with thoughtful planning and implementation, programs can still harness technology to enhance traditional, in-person training to benefit these smallholders, making instruction more impactful and expanding the number of farmers who can be reached.

In partnership with the Wellspring Foundation and Vitol Foundation, and based on research from the [Agriculture in the Digital Age project](#) at Cornell University funded by the Bill and Melinda Gates Foundation, TechnoServe has developed this guide to show how organizations can effectively use technology to improve training for unconnected farmers. The recommendations are based on published research, as well as the experiences and lessons learned from TechnoServe's agricultural programs across Latin America, Africa, and India.



II. Recommended Approaches

RECOMMENDATION 1: USE DIGITAL TOOLS TO TRAIN FARMER TRAINERS

Even if farmers themselves lack access to technology, the people who train them usually do not.

Field teams—including organizations' farmer trainers, government extension workers, buyers and agronomists from private agribusinesses, and staff at cooperatives, among others—who provide training to farmers are typically literate, have a smartphone, and have reliable, periodic (though often not continuous) internet access. This means that there is a significant opportunity to make the training they receive more efficient and effective through the use of digital tools, such as online learning platforms, digital training content libraries, videos, and online communities such as WhatsApp groups. These tools and platforms give trainers real-time access to up-to-date agronomy information and training knowledge.

Figure 2. Use digital tools to train farmer trainers

WHAT IT IS	WORKS BEST WHEN...	KEY BENEFITS
Delivery of training programs through an online learning platform, allowing programs to standardize and scale training of trainers, extension agents, cooperatives or other partner organizations.	<ul style="list-style-type: none">• Trainers have access to smartphone, tablet or computer and at minimum, periodic internet or data access• Trainers are literate	<ul style="list-style-type: none">• Makes programs sustainable and scalable, with easy hand off to governments or successor organizations• Reduces training cost and improves training effectiveness, e.g. by enabling trainer certification• Builds a consistent, standardized base of training content for trainers via the mobile training platform• Allows trainers to refresh their knowledge while in the field

Currently, training-the-trainer (TTT) efforts often involve multi-day, in-person courses, sometimes bringing together field-team members from widely dispersed areas. By adopting a blended approach to TTT, leveraging online learning platforms for pre- and post- in-person-workshop learning, entities can reduce training costs and increase effectiveness. For example, project curricula and agronomic practices can first be presented through an online learning course. Then, in-person training can focus on teaching the critical “soft” skills of training and teaching techniques through live exercises and practice trials (see the description of TechnoServe’s CREATE methodology on page 19).

Then, training videos, WhatsApp groups or other tools can be used to support continued learning and reinforcement throughout the life of the project, when trainers are dispersed in their respective locations.

In addition, a digital TTT platform improves the scalability of programs by providing a consistent training knowledge base for agricultural content. It also improves sustainability of the programs by creating both the technology platform and the knowledge base to hand off TTT materials to government extension programs, cooperatives, and supply chain intermediaries to continue TTT programs after programs end.

The evidence base

While the use of digital tools to enrich training-the-trainer efforts in agriculture is an emerging approach, there is strong evidence of its effectiveness in other fields where trainers provide hands-on instruction, such as healthcare. A qualitative study of a training program for Bangladeshi health professionals found that online distance education was effective at producing sustainable change and recommended that a blended learning approach should also be incorporated (O’Brien et al, 2015). Another summary of studies of TTT approaches applied to healthcare found that “a blended learning approach to deliver TTT programs—combining different techniques such as interactive, multifaceted methods and

accompanying learning materials—can help to effectively disseminate and implement guidelines and curricula to health and social care professionals” (Pearce et al, 2012).

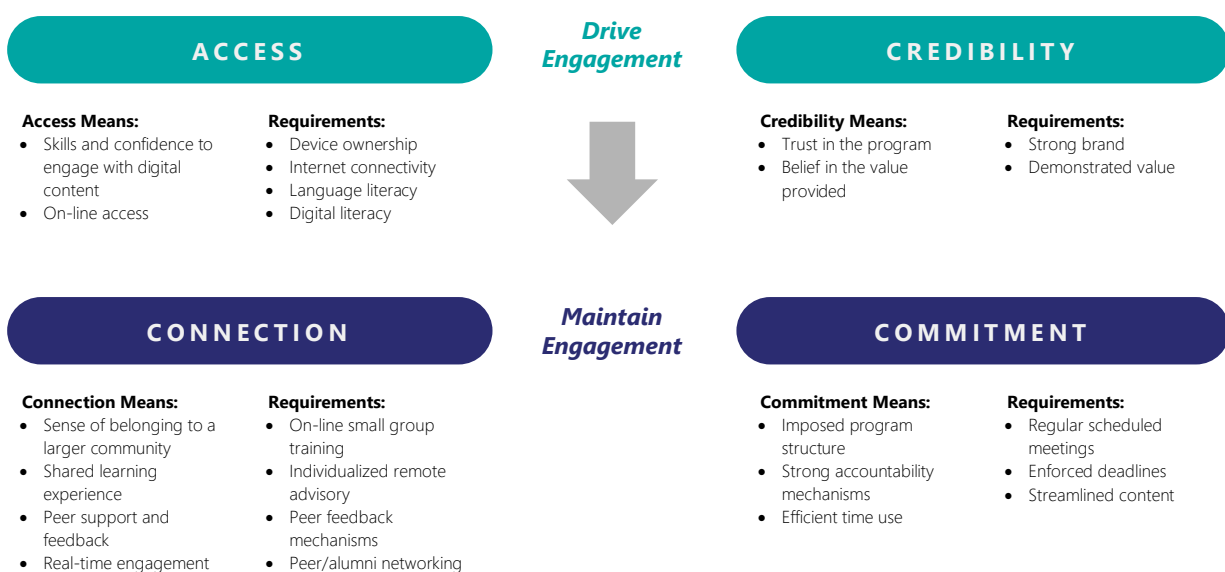
The TTT approach using a combination of online and in-person modes that has shown to be highly effective in environments such as healthcare is also being adopted in agriculture. Since 1993, the Sasakawa Africa Association has implemented the Sasakawa Africa Fund for Agricultural Extension Education (SAFE) to retrain mid-career extension workers in 29 universities and agricultural institutions in 11 countries, and they are now working with regional universities to create an e-learning platform. Even with the e-learning tools, they still see the benefits of a blended approach, combining conventional face-to-face training of extension workers with online training (Fofana et al, 2020).

Research reveals other benefits, as well: the use of digital tools for training may actually attract candidates who are motivated to become advisors and trainers in order to increase their IT capability and marketability, in addition to learning about good agricultural practices techniques (Federicos & Gravoso, 2012).

Putting it into practice

The key to successfully harnessing digital tools in TTT initiatives is to use best practices for impactful remote learning. In 2020, [TechnoServe carried out a study](#) to identify these best practices, drawing upon its work providing remote and blended learning for entrepreneurs. It identified four key principles for remote learning:

Figure 3. The New Remote Model



Programs should select flexible, mobile-friendly platforms that allow trainers to download content on their phones to view at times when they don’t have an internet connection. After evaluating a variety of platforms, TechnoServe has selected TalentLMS, which, in addition to the characteristics described above, allows easy content sharing and duplication of curricula for improved knowledge sharing across projects.

Sessions should be interactive and encourage engagement among participants. Content should be streamlined, because it is difficult for users to pay attention to long virtual training sessions, and material should be relatively short and highlight the most important learning points. For cashew nurseries in Benin, the BeninCajù program created seven week-long modules—each composed of short, focused lessons, delivered via a mobile training app with individual and group coaching via web/phone meetings.

Online platforms also provide an opportunity for trainers to connect with one another to share their own insights and experiences, so it is important to select tools such as WhatsApp or Facebook that facilitate these interactions and integrate them into the training program.

Insights from the field: Connecting cashew farmer trainers in Benin

Cashew is Benin's second largest export crop, farmed by approximately 200,000 smallholder farming families. BeninCajù--a program funded by the U.S. Department of Agriculture and implemented by TechnoServe in partnership with Catholic Relief Services-- has trained more than 60,000 farmers since 2016.

However, an estimated 90% of these farmers lack access to mobile internet, severely limiting the opportunity to use remote training directly with the cashew growers. Instead, training is carried out by a cadre of farmer trainers, who are trained on cashew-farming practices in a series of in-person workshops using Powerpoint presentations and in-class discussion.

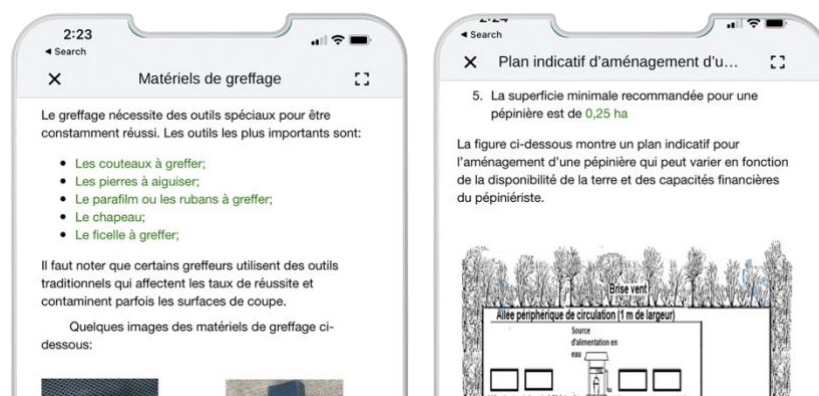
The recent update of the Benin field training manual for cashew farming and nursery management practices represented both a challenge and an opportunity, especially during the COVID-19 pandemic. The challenge was how to convey the information to all of the farmer trainers in a timely, consistent, and efficient manner. But it also provided an opportunity to pilot a new approach for training-the-trainers.

The CajùLabs team is adapting materials from the lengthy formal training documentation to be delivered in a TTT course on a smartphone-based learning management platform. This will allow field trainers to review materials and exercises on the smartphone that they are issued for their work.

The pilot is in its early stages, but the government of Benin has already discussed extending this program to enable certification of extension trainers, which could be completed by adding a certification test to the learning management platform.

The program presents multiple potential benefits for the BeninCajù program:

- Creates a clear path for sustainability, as the content for training extension workers will exist on a self-serve training platform that can be easily copied or replicated by the government, other nongovernmental organizations, or corporate buyers interested in training cooperatives
- Reduces training cost and improves training effectiveness by creating a flexible smartphone-based training platform
- Can be extended to include trainer certification
- Creates consistent, standardized training content
- Allows trainers to review training content in the field, in order to refresh unfamiliar points.



RECOMMENDATION 2: AUGMENT IN-PERSON FIELD TRAINING WITH VIDEO AND AUDIO

Even when farmers can't access videos and audio through phones, audio-visual material can be used to supplement in-person training. Integrating video and audio into in-person training can contribute a number of benefits, including driving scale and consistency, enhancing knowledge transfer and practice adoption, expanding the universe of potential trainers, and creating possible spillover effects from trained farmers to untrained farmers.

Figure 4. Augment in-person field training with video and audio

Approach	WORKS BEST WHEN...	KEY BENEFITS
During in-person field training, trainers utilize video (location and device permitting) or pre-recorded audio in the local language, coupled with visual aids.	<ul style="list-style-type: none">• Trainers have tablets, smartphones and/or portable projectors and speakers	<ul style="list-style-type: none">• Increases farmer engagement• Increases learning and practice adoption of good agricultural practices• Reinforces learnings demonstrated in the field• Generates "spillover effects" or learning to farmers who are *not* trained• Expands universe of available trainers• Allows trainers to focus on client engagement• Provides consistent, standardized training, program-wide• Enhances program scalability by increasing farmer reach per trainer

Evidence base

The use of video and audio in training is supported by a number of studies, highlighting an array of benefits from the practice.

Facilitated video increases knowledge transfer and practice adoption

The benefits of integrating participatory video—video with discussion during training—on training outcomes is well-documented in the literature. In Uganda, short videos were found to be effective at motivating farmers to intensify their rice production (Van Campenhout 2019). A study in Niger found that animated videos were effective vehicles for communicating agronomy information, and adding facilitated group discussion after showing the videos further increased knowledge uptake (Bello-Bravo et al, 2018). There is also evidence from Malawi that participatory video can change farmer perceptions where social/cultural constraints are an obstacle, and that it results in increased practice adoption (Cai, 2019).

Video creates consistency and scalability

Having trainers using the same video content in training sessions improves consistency and scalability of training across different trainers, helping to deliver more consistent impact to farmers across different groups. A study in Ethiopia found that supplementing training with video led to higher adoption of good agricultural practices and agricultural technology, especially for women (Bernard et al, 2016). Another study in Ethiopia found that video-mediated extension training reached a wider audience than conventional training and led to higher levels of agricultural knowledge and uptake of technologies (Abate et al, 2019). Training tends to be more consistent when all trainers are using the same video content to supplement



Farmers were very engaged in the content. Where they saw that the trainer deviated from a practice that was shown in the video, the farmers pointed this out to the trainer. In effect, the farmers reminded the trainer to follow good agricultural practices covered in the training video."

in-person training sessions. Tailored, mediated videos as a supplement to in-person training increases practice adoption and lead to greater consistency across groups (Vasilaky, 2018).

This is equally true for animated videos: coupled with facilitated discussion, they can be effective when used by extension workers, increasing training consistency between trainers (Bello-Bravo et al, 2018). A field experiment in Burkina Faso found that animated videos were as effective as live demonstrations for learning and promoting practice adoption for techniques about which the farmers were already aware (Maredia et al, 2017).

Using video generates “spillover effects” with untrained farmers

A randomized control trial in Ethiopia found that video also created “spillover effects” in adjacent, untreated (untrained) farmer groups (Hörner et al, 2019). This study of an integrated soil fertility management (ISFM) program found that both extension training alone and extension training supplemented with video created increased knowledge. Even more significantly, among untrained farmers in adjacent communities, the study found evidence that “additional video intervention shows a significant complementary effect for these non-actively involved farmers,” especially for the adoption of complex practices. The authors suggest that the videos may have spurred additional conversations about how to adopt practices and that farmer testimonials in the video might have “increased the credibility of information.”

Using video and other mobile phone tech expands the universe of available extension workers

There is also evidence that video and similar tools make the job of training farmers easier and expands the universe of people who can effectively serve on field teams. In India, the introduction of mobile phones in sessions allowed village youths to begin successfully working in farmer training (Fu & Akter, 2016). Digital Green’s experience demonstrated that video resource persons (VRPs) with lower education levels could be hired to deliver training, and that these trainers might be motivated by the desire to become more technically literate (Shukla, 2018).

Very similar to the VRP approach, in 2009, the Grameen Foundation piloted a community knowledge worker (CKW) model for farmer-to-farmer training, using local resources to effectively reach a larger number of farmers. CKWs are equipped with a smartphone, which is used to access weather forecasts, crop price information, good agricultural practices, and activity (visit) monitoring, as well as for communication. CKWs are also used in other countries where they are known by other names—in Colombia they are called “líderes productores” (GFRAS Practice Note, 2015). CKWs are provided smartphones and solar chargers, but the cost of the phone is withheld from their salary over a two-year period, and CKWs are encouraged to rent out their solar chargers for a fee to other farmers. An RCT found that the CKW initiative led to a change in the mix of crops that farmers grow towards higher-profit, higher-risk ones, like coffee, and increased the market price farmers received for maize by 12%; but it did not result in any changes in maize productivity (Van Campenhout, 2017). The use of CKWs is just one example of how technology and locally trained staff can be used in an ICT-enabled, farmer-centric system to address the “last mile” problem of traditional extension approaches (Mapiye et al, 2021).

Some TechnoServe programs found that the use of video in the field allows trainers to focus more on generating *engagement* with beneficiaries because it decreases the trainer’s responsibility for delivering the *content*.



The videos ‘did the work’ for the local community trainers - it decreased their burden; farmers asked questions about the content and trainers could focus on mobilizing the community and getting communities engaged.”

Putting it into practice

When using video and audio to augment field training, it is important to equip teams with the context-appropriate tools suited for local conditions. For example small, portable projectors and speaker systems allow video to be shown to large groups, though it is necessary to find a dark place, like a schoolhouse, to project the video. Some villages do not have schools or other suitable locations to conduct training that includes video; in these cases, other visual tools, like flipcharts, can be used alongside audio. Whenever possible, training content should be recorded in local languages, rather than the official national language.



...using video with the pico projectors made the work of trainers much easier - so trainers did everything they could to make it work."

However, several TechnoServe programs have been able to overcome these challenges; in general, the significant benefits of training augmented with audio/video motivate field teams to find practical solutions. And even in cases where video is impossible, the same effect can be achieved with pre-recorded audio in the local language, synchronized with large 1x2 meter flip charts with pictures, diagrams, and instructional drawings.

A NOTE ON VIDEO LENGTH FOR AUGMENTED FIELD TRAINING

Videos used by field teams do not necessarily need to be as short as videos developed for online use. The literature suggests that videos of 12-15 minutes in duration can be appropriate (Shukla, 2018). The TechnoServe Yieldwise program used videos that were 20-25 minutes long, and would play them two or three times during a training session to enable discussion. Digital Green found that longer videos are appropriate for both field extension training and for training local community trainers (Dubey, 2019).

Training videos do not have to be elaborate, and the more relatable they are to the audience, the better. Farmers like listening to farmers, and this applies to video training content as well. Training farmers to locally produce videos increases productivity and makes agricultural extension services more effective (Harvin, 2013). Digital Green has adapted its use of video to create sets of videos—called a “package of practices”—that address a series of good agricultural practices, and these are shared between members during self-help group meetings and facilitated by VRPs (Shukla, 2018).

Insights from the field: Using video to enhance training for women farmers

The [Business Women Connect program in northern Nigeria](#) trained over 1,000 women on financial literacy, agri-business and decision-making as part of an initiative financed by the ExxonMobil Foundation. The farmers enrolled in the program had very limited access to mobile phones, so training had to be delivered in-person. This created some obstacles, because like many women farmers around the world, the participants had to balance their agricultural activities with domestic responsibilities, making it difficult for them to travel to demonstration plots for training.

However, the program was eager to find ways to make the training more convenient and effective, and the team decided to introduce video into the training sessions.

Part of the success of the program was attributable to use of these pre-recorded training videos to reinforce the lessons on good agronomic practices presented during in-person training at demonstration plots, and to provide training information in rare cases when women were unable to attend the sessions at the demonstration plots. Women and men could view the training videos together, and women often brought their children.

The program found that the use of the training videos delivered via small, portable projectors increased engagement, and a team member reported that the videos “created a calm atmosphere for learning, as there were few or no distractions, with even the children of nursing mothers attracted to, and engrossed in, the motion pictures.” Further, there was no difference in learning between women who received training via the videos and those who did so with demonstration plots.

An assessment found that participants were satisfied with both training methods. They felt that the demonstration encouraged more participation and active learning, while the video was more convenient and easier to attend, because videos were organized closer to the women’s homes than the demonstration plots. The assessment recommended that “the demonstration plot is best suited for learning, while the video is recommended for reinforcing learnings from training in order to encourage knowledge application and, ultimately, adoption and behavioral change. The video is also seen as a more time-efficient means of training rural women, for whom time is particularly critical.”



We made the mistake of creating a beautiful, professionally produced video of a farmer on a large commercial farm talking about good agricultural practices. Our farmers couldn’t see themselves, or their farms, in the video.”

A nonprofit country director in
Latin America



[Women farmers] admired the fact that the video was produced using women like them and from the same cultural environment; they found this motivation – knowing there are women who have perfected their skills applying improved practices in rice production. **“I like the fact that they are fellow women like me.”**

Business Women Connect Annual Report, 2018



RECOMMENDATION 3: INCORPORATE APPROPRIATE DIGITAL TOOLS FOR REMOTE AND BLENDED LEARNING, BASED ON FARMERS' ACCESS TO TECHNOLOGY

In settings where smallholders have access to some technology, for instance to a feature phone or radio, a training approach that integrates these tools to directly reach farmers can be effective. Relevant tools include SMS texts, calls, interactive voice response (IVR), and radio, and these can be deployed in combination with an in-person training program. This integrated approach has typically been found to be more effective than using them independently.

Approach	WORKS BEST WHEN...	KEY BENEFITS
Supplement in-person training with delivery of training content and follow up communication via a combination of digital tools, including: SMS texts, calls, interactive voice response (IVR) and radio. If clients have access to a smartphone, video may also be used.	<ul style="list-style-type: none"> • Farmers have access to some technology, such as radio, TV, or phones (feature or smart) • Multiple tools are used in combination to reinforce learnings from in-person training or incentivize best practice adoption • Farmers are engaged via two-way communication • Messaging is customized and personalized to each individual farmer's local context and field conditions 	<ul style="list-style-type: none"> • Reinforces learnings demonstrated in the field • Increases program scalability • Increases learning and behavior change • Generates high "spillover effects" from radio listeners to non-listeners • Increases capability to provide more personalized or tailored advisory

Evidence base

Radio

There is a broad base of evidence that the use of radio leads to best-practice adoption, especially when used as a part of an integrated program, and that it can create an interactive environment to facilitate peer learning, or "social learning." A review of a Farm Radio International program for women smallholders in Ethiopia, Uganda, Tanzania, and Malawi found that farmers like listening to other farmers, so radio programs are most effective when they use the voice of farmers themselves (Hampson et al, 2017). Radio can also be used in combination with video: a study of training provided to maize farmers in Uganda found that radio was particularly important in providing reach, while video deepened impact, and that it is therefore important to create complementary ICT extension campaigns (Tambo et al, 2019).

Farm Radio International's report ["Reducing Post-Harvest Loss Through Social and Behavioral Change Communication"](#) evaluated the impact of radio programs on farmer knowledge, attitudes toward improved practices, and practice adoption for a total population of 1.4 million listeners targeted through the YieldWise program. The evaluation found that more women listened to radio programming than men and identified high "spillover effects"--shared learning from listeners to non-listeners. The researchers found that listeners' knowledge overall was significantly higher than non-listeners, and radio possibly contributed to increased uptake of various practices to reduce post-harvest loss of tomatoes.

Text and IVR

SMS text messages and IVR are also effective tools in training if they are designed with interactivity in mind. With limited exceptions, on the other hand, one-way text and voice services used to convey information have not been shown to be effective.

Interactive services and customized messaging have been shown to generate positive impacts on learning and behavior change. Two-way IVR advisory for Indian coffee farmers resulted in an 83% adoption rate of one practice, and a 91% recommendation rate of the practice to other farmers. The “Krishi Tarang” advisory service was based on a “missed call” call-back mechanism, so farmers trying the service would not be charged; however, over half of smallholder farmers eventually paid for the service. In addition to sending a weekly standard message and creating voice messages on more than 30 topics that could be selected by farmers, the service allowed farmers to leave messages asking specific questions. Agronomists answered over 1,600 questions from farmers over a six month period, with a commitment to respond within 48 hours. In fact, 50% of questions were answered by agronomists calling back within three hours (Precision Agriculture for Development, 2019).

TechnoServe’s BeninCajù program incorporated a test of voice messaging and callback option in 2019/2020 called “iBPA Mobile,” in parallel with the ProRadio program in an area populated by 67,000 cashew farmers. Over 80% of farmers receiving the calls felt that they were convincing and discussed them with their peers.

Personalization of such services is also important and refers not just to simply using the farmer’s name, but also having extension workers use decision-support tools to capture farmers’ local context and field conditions and customizing advice based on this information. An RCT studying the use of text messaging for optimal fertilizer application rates found that blanket advice failed to achieve potential yield gains for crop production, however “households who were only given personalized advice increase[d] their yield by 7% and increase[d] their profit by 10%” (Arouna et al, 2021).

While there is strong evidence to support the use of SMS and IVR in conjunction with other training approaches, the literature shows that standalone text and voice-based advisory services are not generally effective. Voice-based advisory service in India did not show systematic evidence of gains in yields or profitability (Cole & Fernando, 2012). While in some contexts, SMS messages have been effective at driving behavior change, such as to quit smoking, lose weight, or adhere to a drug regime (Hall et al, 2015), that has not been the case in agriculture, despite the low cost of “e-extension services.” At least one study in Kenya has found that advice delivered through text messages alone throughout the agricultural season was not effective in increasing knowledge or changing behavior for input use (Fabregas et al, 2017). Another study of rice farmers in Nigeria found that blanket “information-only interventions have yielded null results” (Arouna, 2021).

Putting it into practice

TechnoServe Labs’ research identified several key practices on the use of radio in agricultural training. Before a radio intervention is even designed, it needs to be considered within the context of a program’s overall communications strategy, based on the profile of user beneficiaries in the program and the farmer behavior that the program would like to encourage. Second, radio should be used in concert with other tools, as it is rarely effective in isolation.

When it comes time to create radio programs, the content needs to be entertaining and relevant to the audience. It must be of high quality, and users should see themselves reflected in the content, especially in cases in which programs are trying to create aspirational role models to drive changes in behavior. Additionally, it’s important to leverage multiple distribution channels, building a “content constellation,” repackaging and re-using content and scripts from one audio format for other formats, in order to reach different audiences.

Text messaging works best when the content is simple, relevant to the farmer’s immediate situation, personalized, and interactive. Text messages are useful tools for behavior change via targeted, low-content messages, often in the form of

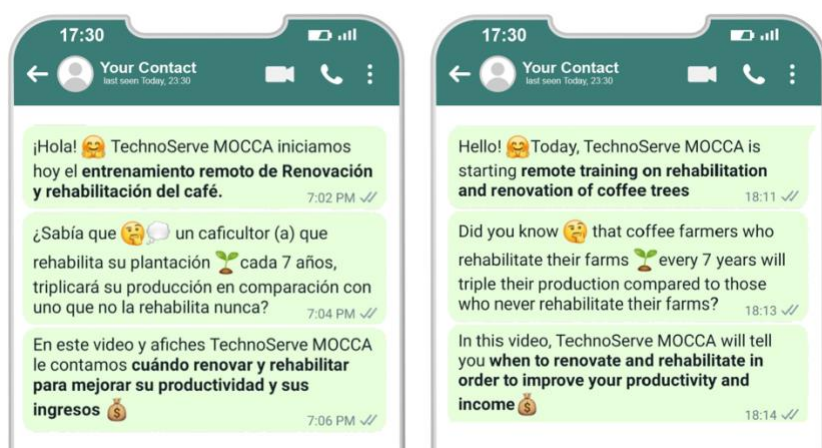
reminders (Fjeldsoe et al, 2009). The reminder effect can be exploited mainly for simple practices that can be acted upon immediately (Laroche et al, 2017). They can also be used for more complex practices, but with a few caveats. Text messages are a promising tool to promote adoption of even complex technologies, but a high level of knowledge is needed to use text messages to simulate their adoption (Laroche et al, 2017). If a farmer has already been trained on a complex practice, and this practice can be summarized with a simple heuristic—a “rule of thumb”—then the text can be used to reinforce the rule of thumb for the complex practice.

EFFECTIVE APPROACHES FOR USING TEXT AND IVR

- Integrated with other communication channels (e.g. radio), as a part of a remote and blended learning program
- For messages that are simple, relevant to the farmer’s immediate situation, personalized, and interactive
- To reinforce in-person training or provide reminders for *simple* practices
- To reinforce in-person training for *complex* practices, where clients already have a high level of knowledge

Insights from the field: Integrated training for Latin American coffee farmers

Maximizing Opportunities in Coffee and Cacao in the Americas (MOCCA) is an initiative funded by the United States Department of Agriculture (USDA) Food for Progress Program and implemented by TechnoServe that has provided remote and blended training to more than 9,000 smallholder coffee farmers across Nicaragua, El Salvador, Honduras, Guatemala, and Peru. The project implements an integrated remote training program (PIER – Programa Integrado de Entrenamiento Remoto) that utilizes WhatsApp, Facebook, and radio to provide training in the form of text, video, and audio to its participants, in addition to in-person training and advisory.



MOCCA’s digital training approach is successful because it is timely, uses multiple media formats across various platforms to repeatedly engage farmers in learning, and leverages digital tools to not just inform farmers but also nudge and remind them to apply best practices.

Training content and messaging delivery is closely coordinated across the different media channels. A multidisciplinary team participates in the development of the digital training content: coffee specialists define and outline the most essential good agronomic practices, and then communication specialists transform the content into user-friendly formats such as manuals, posters, videos, and radio programs. Once the materials are prepared, they are made available to training coordinators, who also integrate WhatsApp messaging focused on essential, high-impact practices to increase proactivity and profitability of producers.

For example, over the course of a four-week training schedule, farmers receive video training modules and digital best-practice posters via WhatsApp in the first two weeks, enabling them to learn and digest the material at their own pace. Then, over the following two weeks, farmers receive WhatsApp messages encouraging them to review the training content and to apply specific practices. Throughout the four-week period, MOCCA also broadcasts weekly radio spots and sends digital attachments aligned with the training schedule to reiterate specific modules or provide more in-depth information on important farming practices.

This combination of self-paced learning and reinforcement activities provides multiple opportunities for farmers to absorb training content. Meanwhile, timely follow-up messages remind farmers to apply best practices as they are in the field and working on their farms in real time.



The videos and manuals that MOCCA sends to my cell phone have taught me the importance of pruning my coffee plantation. Thanks to these practices, my plants are healthier and grow stronger."

Audelly Picado, coffee farmer, Nicaragua



With the MOCCA remote trainings, I have the knowledge at hand. I just open the screen of my cell phone and I am able to get information on good practices to harvest better coffee."

José Rodríguez, coffee farmer in Nicaragua



AREAS FOR FURTHER INVESTIGATION: BRINGING TECHNOLOGY TO THE FIELD

In some cases, where farmers have no technology—radio or otherwise—it may be possible and desirable to provide farmers with tools in order to allow them to access audio or video content. Farm Radio International (FRI) provided listening groups with a solar-powered radio set to record and replay programs using an SD memory card. The extension worker listened to the show with the group, facilitated a discussion, recorded comments and questions, and took recordings back via motorbike to the radio station, which responded to this feedback during the following radio show. Farmers could also “beep” the station—call and then immediately hang up in order to avoid being charged—to prompt a return phone call or message that can trigger deeper engagement with users (Hampson et al, 2017). Further, FRI found that provisioning limited equipment (a wind-up or solar-powered radio and a simple text phone) to listening groups could catalyze further investment in low-cost phones by farming groups.

Talking books are another example of where technology may be provided to a community that does not otherwise have access to it. In Ghana, UNICEF studied using Amplio talking books to educate rural communities about community-based health and planning services for pregnant women, lactating mothers, and men accompanying their spouses. According to organizers, the pilot improved a number of healthcare outcomes, such as uptake of prenatal health care and immunizations. Also, the program improved the ability of nurses to combine clinical and health education duties, and decreased language barriers because the messages in the talking book are in the preferred local language of beneficiary communities (Nurzhynska, 2021).

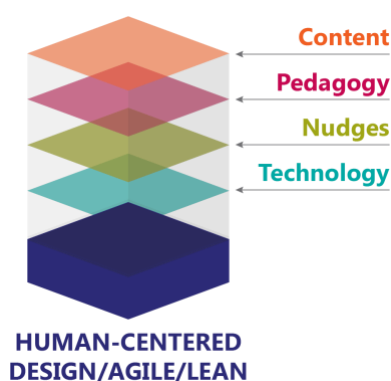
In another example of providing technology to communicate with groups in rural communities, TechnoServe is working with DreamStart Labs to pilot the DreamSave app in Benin and digitize the records of over 100 informal savings and internal lending groups (SILCs). TechnoServe is also testing the use of the DreamSave app for communication and two-way survey capability with the groups, whose members—primarily women—meet weekly. While none of the SILC group members have individual smartphones, the DreamSave app is installed on a smartphone administered by the group. If this test is successful, it may lead the SILC groups to invest in shared phones for other purposes, including agronomic training outside of the SILC group meeting time.

Finally, it may be that independent of any training on agricultural practices, access to a phone and knowing how to use it is a major determinant of practice adoption, especially among women. In a study in Niger, households given access to a phone and taught how to use it increased production of marginal cash crops. This was particularly true of women who were given access to the technology. Further, the study found that “the impact is much stronger among households who owned mobile phones at baseline, suggesting that access to phones was less important than learning how to use them” (Aker & Ksoll, 2016).

III. Factors for Success

Developing an effective strategy for using digital tools in training programs for unconnected farmers is not only about selecting the appropriate approaches described above. The foundation for success with any digital enablement strategy is driven by a solid understanding of user needs and rapid testing to get customer feedback—in short, using **human-centered design** and **lean/agile development**. Building on a solid understanding of user needs and rapid test cycles, teams must also develop quality **content**, determine the best delivery and learning **pedagogy**, incorporate behavioral economic "**nudges**" and, last of all, identify the most appropriate enabling **technologies**.

Figure 5. Program Innovation at TechnoServe



Human-centered design (HCD) means starting with the users/beneficiaries and their context and then building learning solutions that work for them. While the suggested digital training approaches are widely applicable across projects that work with smallholder farmers or more rural, less connected clients, it will always be important for projects to think through their user and his or her context when developing their digital training strategy. In some cases, projects may find they need to tailor their approaches to specific cohorts of participants, based on age, location, gender, literacy, and access to technology.

Lean/agile development principles, or a “**build- measure- learn**” cycle, which involves testing and iteratively improving solutions based on beneficiary feedback, is crucial for producing effective solutions. Teams should not wait six months to find that an approach is wrong. Instead, implementation teams should field test and rapidly improve solutions in short cycles of a few weeks or months, with continuous feedback from end users.

A team must then consider **content**. The training content itself—the lessons, modules, visuals, and videos—need to be of consistently high quality. This finding was reinforced by the research on radio programming: content should be not only informative, but engaging and relevant to the viewers.

The **pedagogy** of how teams deliver material is critical. This is not the channel —radio, text, workshop, social media — but how teaching is structured so that the learning process is effective. TechnoServe uses the “**CREATE**” methodology: Connect, Reflect, Engage, Activate, Test/Try out, Encourage (see text box). This methodology empowers the student to play an active role in his or her learning and incorporates activities to encourage the student to practice and demonstrate new skills in real time.

Effective pedagogy is important, regardless of the channel used for the training. It is also important to note that most project trainers and extension agents are accustomed to only providing in-person training in the field, so time needs to be invested to show trainers how to train with new digital tools—for example, how to facilitate WhatsApp groups or host Facebook live sessions. They need to understand how they can use these new digital platforms to promote more

engagement, reflection and feedback from farmers in the field. This type of platform management is an additional task for trainers, so supporting them to invest time in digital communication with participants is key.

Third, **nudges** and behavioral economics approaches, including effective decision architecture, ensure that knowledge leads to practice adoption. Nudges can be incorporated deliberately into an integrated remote learning program by using tools in combination. Text messaging, for example, can be effective as a nudge, provided messages are simple, relevant to the farmer's immediate situation, personalized, and interactive.

THE CREATE METHODOLOGY

Connect. Help learners connect to the significance and relevance of the learning to their lives. Help them to recall what they already know, so they can build on their experiences, their knowledge, and the things that matter to them personally.

Reflect. Give learners an opportunity to reflect on what they have experienced, to think about what it means, to make their own connections and prepare to use what they have learned in their own lives.

Engage. Engage and involve learners. Create an interaction-rich environment to encourage them to get involved and co-create their own learning experience.

Activate. Help learners become active. Make sure the energy is right for learning. Vary the tempo and types of activities to keep learners engaged and active.

Test & Try Out. Make sure you are giving the learners enough time to test their knowledge, to try out the skills, and “try on” the new thinking and new possibilities in the program so that they can get coaching and feedback along the way.

Encourage. Encourage learners to overcome any limiting beliefs that are blocking their development. Provide coaching and mentoring.

Finally, it is crucial for projects to select technology that project participants have access to and is appropriate for delivering relevant content. For example, videos and learning platforms are better suited for full training modules and informing participants of new concepts, whereas text messages are better suited for reinforcing simple concepts or reminding participants to apply a practice at the relevant time. Projects may want to consider introductory training sessions for learning platforms or providing data packages if participants are expected to digest a majority of the training content digitally. ■

Sources

- Abate, G. T.; Bernard, T.; Makhija, S.; & Spielman, D. J. (2019). Accelerating technical change through video-mediated agricultural extension: Evidence from Ethiopia. IFPRI Discussion Paper 1851. Washington, DC: International Food Policy Research Institute (IFPRI).
- Aker, J. C., & Ksoll, C. (2016). Can mobile phones improve agricultural outcomes? Evidence from a randomized experiment in Niger. *Towards a Food Secure Future: Ensuring Food Security for Sustainable Human Development in Sub-Saharan Africa*, 60, 44–51.
- Arouna, A., Michler, J. D., Yergo, W. G., & Saito, K. (2021). One size fits all? Experimental evidence on the digital delivery of personalized extension advice in Nigeria. *American Journal of Agricultural Economics*, 103(2), 596–619.
- Bello-Bravo, J., Zakari, O. A., Baoua, I., & Pittendrigh, B. R. (2018). Facilitated discussions increase learning gains from dialectically localized animated educational videos in Niger. *Information Technology for Development*, 25(3), 579–603.
- Bernard, T., Makhija, S., Orkin, K., Taffesse, A. S., & Spielman, D. J. (2016). Video-based agricultural extension: Analysis of a pilot project in Ethiopia. Project Note. Washington, D.C.: International Food Policy Research Institute (IFPRI).
- Cai, T., Steinfield, C., Chiwasa, H., & Ganunga, T. (2019). Understanding Malawian farmers' slow adoption of composting: Stories about composting using a participatory video approach. *Land Degradation & Development*, 30(11), 1336–1344.
- Cole, S. A., & Fernando, A. N. (2012). 'Mobile'izing agricultural advice: Technology adoption, diffusion, and sustainability. Harvard Business School Finance Working Paper No. 13-047.
- Fabregas, R., Kremer, M., Robinson, J., & Schilbach, F. (2017). Evaluating agricultural information dissemination in western Kenya. 3ie Impact Evaluation Report 67. New Delhi: International Initiative for Impact Evaluation (3ie).
- Federicos, M. A., & Gravoso, R. (2012). Outcomes of learning online: The case of farmers and extension workers in the Philippines. *Annals of Tropical Research*, 34(1), 129–146.
- Fjeldsoe, B.S., Marshall, A.L., Miller, Y.D. (2000). Behavior change interventions delivered by mobile telephone short-message service. *American Journal of Preventive Medicine*, 36(2), 165–73
- Fofana, B., Halos-Kim, L., Akeredolu, M., Okiror, A., Sima, K., Naibakelao, D., Oluoch, M., & Iseki, F. (2020). Innovative agricultural extension value chain-based models for smallholder African farmers. *Frontiers of Agricultural Science and Engineering*, 7(4), 418–426.
- Fu, X., & Akter, S. (2016). The impact of mobile phone technology on agricultural extension services delivery: Evidence from India. *The Journal of Development Studies*, 52(11), 1561–1576.
- Hampson, K., Leclair, M., Gebru, A., Nakabugo, L., & Huggins, C. (2017). 'There is no program without farmers': Interactive radio for forest landscape restoration in Mount Elgon Region, Uganda. *Society & Natural Resources*, 30(5), 642–657.
- Harvin, K. (2013). Lessons learned from locally produced videos: The approach of Digital Green in India MEAS Case Study. Available: <https://agrilinks.org/sites/default/files/resource/files/MEAS%20CS%20India%20-%20Digital%20Green%20-%20Kerry%20Harvin%20-%20Nov%202013.pdf>
- Hörner, D., Bouguen, A., Frölich, M., & Wollni, M. (2019). The effects of decentralized and video-based extension on the adoption of integrated soil fertility management: Experimental evidence from Ethiopia. NBER Working Paper 26052.

Larochelle, C., Alwang, J., Travis, E., Barrera, V. H., & Dominguez Andrade, J. M. (2019). Did you really get the message? Using text reminders to stimulate adoption of agricultural technologies. *The Journal of Development Studies*, 55(4), 548–564.

Mapiye, O., Makombe, G., Molotsi, A., Dzama, K., & Mapiye, C. (2021). Towards a revolutionized agricultural extension system for the sustainability of smallholder livestock production in developing countries: The potential role of ICTs. *Sustainability*, 13(11), 5868–5885.

Maredia, M. K., Reyes, B., Ba, M. N., Dabire, C. L., Pittendrigh, B., & Bello-Bravo, J. (2017). Can mobile phone-based animated videos induce learning and technology adoption among low-literate farmers? A field experiment in Burkina Faso. *Information Technology for Development*, 24(3), 429–460.

Nurzhynska, A. (2021). Talking books to facilitate behaviour change in rural communities in Ghana. The Communication Initiative Network. Available: <https://www.comminet.com/polio/content/talking-books-facilitate-behaviour-change-rural-communities-ghana>

O'Brien, L., Broom, L., & Ullah, M. (2015). Outcomes and participant experience of an online train-the-trainer program for Bangladeshi health professionals: a case study evaluation. *Journal of Continuing Education in the Health Professions*, 35(1), 46–56.

Pearce, J., Mann, M.K., Jones, C., van Buschbach, S., Olff, M., & Bisson J.I. (2012). The most effective way of delivering a train-the-trainers program: a systematic review. *Journal of Continuing Education in the Health Professions*, 32(3), 215–226.

Precision Agriculture for Development (2019). A customized mobile phone-based extension service for coffee growers. Available: https://precisionag.org/wp-content/uploads/2019/12/Coffee-Board-Review_-2019-compressed.pdf

Shukla, R. (2018). Analysing the learnings from the Package of Practice. Digital Green. Available: https://www.digitalgreen.org/wp-content/uploads/2017/06/ANALYSING-THE-LEARNINGS-FROM-THE-PACKAGE-OF-PRACTICE_formatted.pdf

Tambo, J. A., Aliamo, C., Davis, T., Mugambi, I., Romney, D., Onyango, D. O., & Byantwale, S. T. (2019). The impact of ICT-enabled extension campaign on farmers' knowledge and management of fall armyworm in Uganda. *Plos One*, 14(8).

Van Campenhout, B. (2017). There is an app for that? The impact of community knowledge workers in Uganda. *Information, Communication & Society*, 20(4), 530–550.

Van Campenhout, B. (2019). The role of information in agricultural technology adoption: Experimental evidence from rice farmers in Uganda. *Economic Development and Cultural Change*, 69(3), 1239–1272.

Vasilaky, K., Toyama, K., Baul, T., & Karlan, D. (2018). Learning Digitally: Evaluating the impact of farmer training via mediated videos. J-PAL.

HEADQUARTERS

1777 N Kent Street | Suite 1100 | Arlington, VA 22209

T +1 202 785 4515 | F +1 202 785 4544

