Chapter 9
Digital Literacy and Agricultural Extension in the Global South

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Introduction

The global agriculture sector is undergoing profound changes because of digital transformation or digitalization (Matos et al. 2020). While the impact of COVID-19 has helped to accelerate the digitalization process, the disruption caused by the pandemic has also revealed systemic barriers in parts of the world where digital literacy remains relatively low (Ceballos et al. 2020; Mohapatra 2020). So far, research into the social and economic impact of digital transformation of the agriculture sector has come mainly from researchers working in the Global North (Bronson and Knezevic 2019; Phillips et al. 2019). However, the UN's Food and Agriculture Organization (FAO) and the World Bank are now encouraging digital agriculture in the Global South and there is growing recognition that 'a critical approach toward the pervasive application of digital technologies in developing and emerging country agriculture is much needed' (Klerkx 2019, p. 12).

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Small-scale farmers are particularly exposed to unintended negative impacts of digitalization (Ending hunger 2020; Pereira et al. 2018). Smallholders produce more than 70% of the food consumed in countries of the Global South (Fanzo 2017; FAO 2020), where they play a crucial role in maintaining the genetic diversity of the food supply and contribute to food security for many cities worldwide, playing a vital role in the UN's Sustainable Development Goals (Lowder et al. 2016). These are usually family-operated farms with small plots of land located in rural areas and traditionally low-tech operations. However, researchers and activists are concerned that digitalization efforts in the Global South will tend to marginalize the voices of smallholders while altering established farming practices and patterns of social relations in their communities, especially for women and youth (Bronson 2018; Fraser 2019; GRAIN 2021; Rotz et al. 2019).

Despite these concerns, there is evidence that digitalization can also help farmers maintain their independence and introduce innovative practices to enhance their livelihoods (Cisneros and Roberts 2021; Matthews 2017). An important step in this direction is to empower smallholders to participate more actively in discussions and decisions related to digital agriculture (Bonina et al. 2021). Agriculture extension and advisory services (EAS) can contribute to these efforts by supporting digital literacy development within these communities (Dlamini and Worth 2019; Shilomboleni et al. 2020; Steinke et al. 2020). Laurens Klerkx, a leading voice in this area, states that 'what is crucial to acknowledge is that there is a plurality of [digital] transition pathways which co-exist, intersect, collaborate, or compete' (Klerkx 2020, p. 132). EAS organizations will play a crucial role in guiding those transitions in their work with smallholders and rural communities. Moreover, digital literacy is now considered central to a 'new extensionist' agenda and national 'e-agriculture' strategies (Davis 2015; Ganpat et al. 2016; Wanigasundera and Atapattu 2019).

EAS organizations will need to look beyond the immediate training needs of their field staff (Narine and Harder 2019; Norton and Alwang 2020) to introduce digitalization strategies that take into account the priorities, aspirations, and constraints of smallholders and the communities they serve. The ability of smallholders to collectively assert community-based control and autonomy in decisions regarding digital practices, as well as the data produced by those practices, is aligned with the concept of digital self-determination (Remolina and Findlay 2021, p. 18). Advancing the prospects of digital self-determination for smallholders raises three important questions: What is the role of EAS organizations when it comes to promoting digitalization in agriculture? How does digital literacy figure into this effort? What practical steps can EAS practitioners take to empower smallholders to make reasoned choices regarding digital ICTs and their integration into local work practices and processes?

The intent of this chapter is to begin to address these questions by presenting a conceptual framework that draws a connection between the literature on agriculture innovation systems with an interactionist view of digital literacy from organizational studies. We then explain how this view of digital literacy aligns with a capabilities-centric approach within ICT for development (ICT4D) by situating it along four degrees of empowerment from Kleine's Choice Framework (Kleine

2013). The final section of the chapter includes examples of how this framework can be used, which are based on preliminary findings from an action research study involving EAS practitioners in Trinidad and Sri Lanka (Gow et al. 2020b). The overall goal of that ongoing research project is to improve our understanding of the relationship between EAS practitioners, digital capabilities, and inclusive innovation within the agriculture sector, especially among smallholders and their communities.

Agricultural Extension: A Brief Overview

The origins of agricultural extension and advisory services (EAS) in the Global South began with efforts by colonial governments during the nineteenth century to improve crop yields in agricultural products for export. With the advent of the Green Revolution in the 1950s and 1960s, these countries were encouraged to introduce national agricultural advisory services, focusing on transferring knowledge and skills from research institutions to farmers and farming communities as a strategy to apply modern science to crop production (Ganpat 2013). For much of its history, EAS practitioners applied a 'linear model' of technology transfer within a modernization paradigm of development that sought to introduce innovations in agriculture technology primarily from the Global North with the assistance of government extension officers working directly with farmers (Heeks 2018).

Today, the linear transfer model co-exists with an agricultural innovation systems (AIS) framework 'focusing more broadly on the factors that stimulate innovative behavior and stress[ing] linkages and partnerships with a wide range of actors along agricultural value chains, including the agribusiness sector' (Anderson 2008, p. 9). While the AIS paradigm has yet to be fully embraced by EAS organizations in the Global South, it reimagines the agricultural extension system as a bridging institution that coordinates the flow of information across multi-stakeholder networks involving farmers and other actors such as agriculture scientists and educators, suppliers of inputs and financial services, as well as consumer-facing stakeholders responsible for food safety, distribution, and marketing.

Another significant change over the previous two decades has been a sharp decline in funding of public sector EAS accompanied by other structural changes that have given rise to a plurality of alternative providers that include the private sector, non-profit, and producer organizations in this domain (Benson and Jafry 2013; Blum et al. 2020). Nonetheless, a vital role for public sector EAS continues within the AIS paradigm because it often serves smallholder communities who typically have a complex portfolio of needs, a limited ability to pay for private services, and who could benefit from a diversification of livelihood strategies to support vulnerable and marginal groups, such as women and the poor (Benson and Jafry 2013, p. 389). In meeting this need, public sector EAS is uniquely positioned to lead digitalization efforts with smallholders and the rural communities in which they work and live.

Digital Capabilities in the Agriculture Sector

Research on digital transformation of the agriculture sector has identified several factors that influence farmers' adoption and use of technology. Khanna (2021) suggests a distinction between 'technological factors' and 'farmer characteristics' among a range of considerations in understanding adoption patterns. Within the category of technological factors, learning barriers are significant when farmers encounter unfamiliar and often technically complex equipment and services. Under these conditions, farmers seek information from others within their community, with EAS practitioners playing an instrumental role 'critical in building trust in the technology, lowering learning costs, and protecting farmer interests' (Khanna 2021, p. 1233). The uncertainty surrounding digital transformation will also prompt anxieties about deskilling, data ownership, and privacy as farmers confront technologies requiring them to delegate important decisions to machine learning systems and share information with third-party service providers about their cultivation practices, input use, and yields.

Behavioural factors also play a role in shaping digital transformation efforts. Farmer's adoption decisions are affected by a range of individual cognitive processes, such as perceptions about the risk to their livelihoods using cost-benefit assessments based on local conditions, as well as emotional disposition and personal experience. These behavioural factors extend to include the influence of group dynamics when introducing farmers to new technology-related agricultural practices during interactions with peers and other influential actors (Khanna 2021, p. 1234).

Digital literacy levels among farmers in the Global South have been examined in recent studies (Khan et al. 2020), with consistent findings showing a positive correlation between education levels, digital skills, and adoption of new technologies. However, the UN Food and Agriculture Organization (FAO) has identified low 'e-literacy and digital skills' as barriers to ICT adoption in the agricultural and rural development sector. In these settings, deficiencies in basic literacy, numeracy, and access to computing courses, further limit digital skills attainment (FAO 2019, p. 4). Nonetheless, policymakers and practitioners view it as essential for digital transformation:

> Digital skills and e-literacy remain a significant constraint to the use of new technologies and are particularly lacking in rural areas, especially in developing countries. The diversity of available digital technologies and a lack of standardisation also present a barrier to adoption. The choice of which technology to use is complex and there is a lack of advisory services to support farmers in these decisions. Education and supporting services must be improved to support the adoption of digital technologies. (FAO 2019, p. 15)

Despite its frequent mention, many of these studies and reports devote little attention to critically reflecting on digital literacy and how it fosters capabilities that can promote pathways towards digital self-determination among smallholders within the wider agricultural innovation system.

An Interactionist View of Digital Literacy

A lack of critical reflection on the concept of digital literacy is not unique to the agriculture sector but is also found in organizational studies on digital transformation (Cetindamar Kozanoglu and Abedin 2021). While that literature has identified digital literacy as a 'critical dynamic capability of organizations during their digital transformations,' it has tended to focus on individuals rather than the social context of technology adoption (Cetindamar Kozanoglu and Abedin 2021, p. 1650). This realization has prompted efforts to conceptualize an 'interactionist approach' to digital literacy research.

The interactionist approach introduces the notion of *organizational affordances* based on recent developments in affordance theory and its application to the study of information systems (Cetindamar Kozanoglu and Abedin 2021). Affordance theory first appeared in the work of James Gibson, the founder of ecological psychology, and was later incorporated into human–computer interaction (HCI) research by Donald Norman (Anderson and Robey 2017). In its early conception, the theory tended toward a cognitivist view in understanding how individuals came to interpret and use technologies. Good design practice was considered essential in revealing to users the intrinsic and intended features and functions—*the affordances*—of an artefact or software application. Drawing on adaptive structuration theory and Orlikowki's 'practice lens' for studying technology in organizational settings (Orlikowski 2000), the concept of affordance has since been expanded to distinguish between 'affordances in information' and 'affordances in articulation' to describe differences between the features incorporated into design versus the social context of use (Vyas et al. 2016). These two types of affordances are combined into an 'organizational affordances' model that accounts for the mutual influence of individual and group level dynamics on technology adoption in the workplace.

In applying the organizational affordances model to digital literacy, Cetindamar Kozanoglu and Abedin (2021) reference Stordy's taxonomy of literacies (Stordy 2015), making a crucial distinction between *autonomous* and *ideological* models of literacy. Whereas autonomous models tend to view literacies as 'an individual's intellectual abilities … for which they are largely responsible,' ideological models by contrast 'view literacy as a social practice that cannot be detached from its context which both creates and perpetuates it' (Stordy 2015, p. 460). Stordy's analysis further suggests that training programmes focussed on autonomous literacy tend to promote conformity as a pathway to self-improvement and emphasize workplace productivity as a primary objective. On the other hand, ideological approaches tend to align with a holistic human development paradigm that views literacy training as a foundation for critical thinking, empowerment, and community building. Stordy synthesizes these two views to form a definition of literacy as an individual cognitive skill within the context of group action:

> (t)he abilities a person or social group draws upon when interacting with digital technologies to derive or produce meaning and the social learning and work practices that these abilities are applied to. (Stordy 2015, p. 472)

This definition provides the basis for an interactionist model of digital literacy that encompasses 'affordances in information' and 'affordances in articulation' (Cetindamar Kozanoglu and Abedin 2021). Digital literacy in relation to

information affordances refers to an individual's understandings and interpretations of a technology or software application. These might be considered the 'what' aspects of a technology evident to a user (Vyas et al. 2006). Novice users will presumably have more modest abilities concerning the 'what' aspects than experienced users. For example, an individual's competence in utilizing the features and functions of a word-processing application will expand as he or she is exposed to and trained in its use. As such, the actualization of information affordances—or what Anderson and Robey (2017) refer to as 'affordance potency'—will be closely related to an individual's exposure to a device and/or software application. As Norman's earlier work sought to demonstrate, good design is integral to this actualization, but information affordances also extend to encompass the role of formal training, exposure to marketing materials, and informal learning that happens when individuals on their own explore the features of a technology.

Digital literacy in relation to *articulation affordances* refers to a shared set of procedural understandings of a technology in use (Vyas et al. 2006, p. 95). These are the 'how to' aspects that emerge as technology is enacted in practice or the 'this-is-how-we-do-it-here' dimension established and reinforced in the context of group dynamics or professional practice. Articulation affordances are expressions of the adoption of technology in specific social settings. For example, in some contexts, such as large commercial publishing, a word processing application may be integrated into a business process that actualizes many of the advanced features and functions of the software during manuscript preparation. Compare that example with a small group of volunteers that requires only the most basic features of the same software to produce a community newsletter. Each group uses the same technology, but the varying social contexts of use actualize different articulation affordances.

These examples illustrate Stordy's definition of digital literacy as an *interaction* between individual skills relative to the context of use. This dialectical relationship is expressed in an 'organizational affordances' model to guide digital literacy development within the workplace (Cetindamar Kozanoglu and Abedin 2021). Figure 9.1

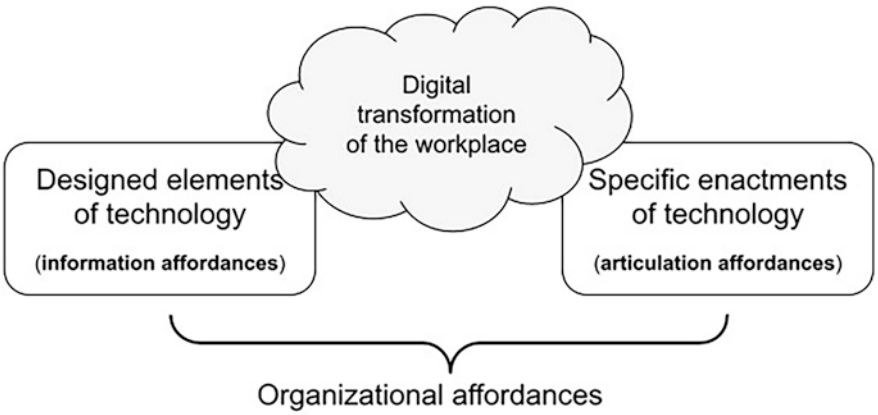

Fig. 9.1 The organizational affordances model adapted from (Vyas et al. 2016). Digital transformation encompasses both information and articulation affordances

depicts this model to illustrate how the digitalization outcomes emerge through the ongoing interaction of information and articulation affordances.

EAS Organizations and the Digital Literacy Dilemma

The organizational affordances model presents a dilemma for EAS organizations when it comes to planning a strategy for promoting digital literacy. Emphasis on digital skills in relation to specific technologies—an 'information affordances' focus—will be necessary to establish agricultural workers competent in using those technologies. However, this by itself might not create sufficient conditions for workers to adopt a new digital practice. While farmers may perceive value in such training, other priorities may take precedent when it comes to their decisions about using new ICTs. Getting fair prices for their crops, calling for improvements in infrastructures to transport their produce to markets, as well as other community concerns will be more immediate concerns for farmers (Iazzolino 2021). In other words, despite efforts at providing them with digital skills training, farmers and other workers may remain reluctant to use new technologies because they are considered a distraction from more pressing concerns or because others in the community are not yet using them.

One response may be for organizations to simply go ahead and launch a digital initiative and impose on agriculture workers to adapt accordingly. For example, farmers might be required by law to adopt specific digital practices to conform to a food traceability system introduced by a government department or a large buyer. This is a top-down initiative that actualizes a prescribed set of articulation affordances with digital ICTs. Such a strategy runs the risk of overlooking local conditions and disrupting established processes on the farm and relationships across the agricultural value chain. For example, the Indian government's controversial Agristack initiative will require all farmers to conform to a 'Unified Farmer Service Interface' designed by Microsoft as mandated by the national government (Kapil 2021). However, opponents of Agristack (Internet Freedom Foundation 2021) have argued that this policy threatens to disempower smallholders while undermining long-standing practices, thereby limiting future opportunities for inclusive digitalization efforts within the agriculture innovation system.

Resolving the digital literacy dilemma for smallholder farmers in the Global South will require EAS organizations to incorporate a multi-faceted approach that actualizes both information and articulation affordances as they introduce farmers and other agriculture workers to new digital practices. On the one hand, training will need to focus on developing individual digital skills with respect to the information affordances of specific ICT tools and systems. These will include competencies such as information and data literacy, communication and collaboration, digital content creation, online safety, and problem-solving with ICTs. On the other hand, training will also need to factor in articulation affordances by considering how ICTs will be integrated into and transform established social practices among farmers and

other agriculture workers. For example, the ability of smallholders to actualize the features and functions of a digital crop monitoring and management system may be limited as compared with agribusiness operations that have dedicated resources for training and IT support at their disposal.

A digitalization strategy targeted to smallholders can benefit from an interactionist approach to digital literacy because it recognizes a dialectical relationship between individual skills and group-level dynamics in the adoption and use of ICTs. The organizational affordances model presents digitalization as an emergent outcome resulting from the interaction of information affordances and articulation affordances, suggesting that both aspects will need to be considered when it comes to planning and evaluating a digital literacy training programme.

Putting It into Practice: The Technology Stewardship Training Programme

This section illustrates how an interactionist approach to digital literacy has been incorporated into an ICT training programme for agricultural extension officers in the Global South. We draw on initial results from qualitative research conducted with EAS practitioners, highlighting examples from Sri Lanka and Trinidad. The project methodology is similar to the Ethnographic Action Research (EAR) design for ICT4D projects first introduced by Tacchi and her colleagues in various Southeast Asian countries, including Sri Lanka (Tacchi 2015). Our project focusses on EAS practitioners, who are trained in a set of ICT4D-related skills and then invited to become co-researchers serving as liaisons between the communities they serve and the academic research team.

The training programme also builds on previous efforts to study agricultural workers as communities of practice (Adelle et al. 2021; Morgan 2011; Nuutinen and Filho 2018; Tran et al. 2018; Triste et al. 2018). More specifically, our project focusses on 'technology stewardship' as a catalyst for digitalization. Wenger et al. (2009) introduce the term technology stewardship to describe a role for individuals who support the decisions to select and use digital technologies within a community of practice (CoP). Technology stewardship is an informal leadership role for cultivating the 'digital habitat' with the members of a CoP:

> Technology stewards are people with enough experience of the working of a community to understand its technology needs and enough experience with or interest in technology to take leadership in addressing those needs. Stewarding typically includes selecting and configuring the technology and supporting its use in the practice of the community. (Wenger et al. 2009, p. 25)

EAS practitioners are good candidates for this role because they typically represent knowledgeable intermediaries within one or more communities of practice. Research findings from other ICT4D studies suggest the type of intermediary role

played by EAS practitioners is influential in fostering inclusivity within the agriculture innovation system (Heeks 2018, p. 60), particularly when it comes to smallholders as well as women and other marginalized groups living in rural communities (Ayre et al. 2019; Oreglia 2014; Walsham 2020).

In our adaptation, the intermediary role of the technology steward is guided by Kleine's four-step empowerment model or 'Choice Framework' (Kleine 2013). The Choice Framework sets out a progression of capacity building activities from a basic introduction to ICT and leading up to its integration into practice, which involves four overlapping stages (Kleine 2010). The first stage begins with creating an *awareness* of technology choices that are available to a community of practice (CoP). The next stage is then to foster *a sense of choice* by providing examples of how members of the CoP might apply technology to address an existing priority or aspirational objective. The third stage involves facilitating the *use of choice* through pilots or prototypes with specific ICT solutions. Kleine refers to the fourth stage as the *achievement of choice* to indicate a transformative moment when members of the CoP, guided by the technology steward, assess the suitability of the chosen ICT solution with respect to community needs and ambitions. Normatively speaking, the primary development aim is therefore to promote 'choice itself' (Kleine 2011, p. 125) as an essential step towards digital self-determination.[1]

Our project has drawn from these various sources to create and introduce a training programme titled 'ICT Stewardship for Agricultural Communities of Practice' that was tested with EAS practitioners between 2016 and 2019, involving two cohorts in Sri Lanka in partnership with the University of Peradeniya, and two cohorts in Trinidad in partnership with the University of the West Indies. To date, a total of 80 EAS practitioners have participated in the programme, and future offerings are now being planned. Starting in 2018, cohort members were invited to complete a capping project by conducting a small-scale action research project or 'campaign' with a community of practice of their choosing. These capping project campaigns provide an opportunity to conduct participatory action research with EAS practitioners as they take up an intermediary role intended to foster 'situated learning' (Lave and Wenger 1990) between farmers, other community members, technology sponsors, and academic researchers.

Figure 9.2 depicts the overall project design, showing the relationship between technology stewardship training and the capping project campaign as a form of action research. The dialectic between information and articulation affordances that arises out of the action research campaign fosters emerging capabilities along the four stages of empowerment in the Choice Framework. These capabilities become the basis on which a CoP can begin to make reasoned choices about its pathway to digitalization.

[1] We would note that Kleine's Choice Framework and its normative orientation toward capabilities aligns with the Stordy's 'ideological model' that views literacy less as a vehicle for conformity and more as a catalyst for critical thinking and empowerment.

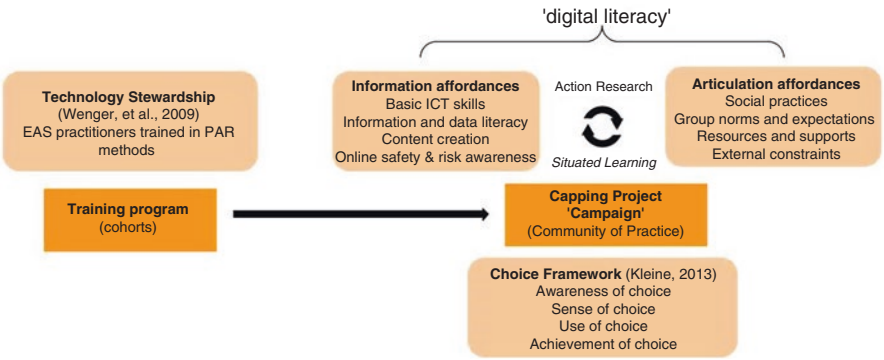

Fig. 9.2 The technology stewardship programme as an interactionist approach to digital literacy

Insights from Two Capping Project Campaigns

Elsewhere we have provided specific details on our research design, implementation, and initial results from the pilot phase of the technology stewardship project (Gow et al. 2020a, c). For the purpose of this chapter, we will consider two capping project reports that illustrate the value of an interactionist model in guiding the efforts of a technology steward as they lead digitalization efforts with a community of practice.

From Articulation Affordances to Information Affordances—Assessing Individual Digital Skills

Technology stewards are trained to create a campaign goal statement that includes a specific target for a specific activity, and with a clearly defined community of practice in mind. The stewards are instructed not to identify a particular digital tool or platform when creating the goal statement but instead to work with the community to describe a 'communication action' priority derived from a set of 'community orientations' set out in Wenger et al. (2009, p. 69). In effect, the campaign goal statement is intended to emphasize articulation affordances by identifying deficiencies in social practices or organizational processes that might be addressed with the application of ICT.

The campaign goal statement provides a basis on which the technology steward can then identify the information affordances that will be required in an ICT solution. Having identified a set of information affordances, the technology steward can then undertake a digital skills assessment of community members. For example, Fig. 9.2 shows a planning table created by Suranjan, an instructor with the Sri Lanka

Department of Agriculture, who attended our training course in 2018. His capping project identified 'Seed paddy producers in the Galle District' as the community of practice. The communication action in the campaign goal statement is 'improving access to expertise,' which led them to focus on articulation affordances and to think differently about how they used their mobile devices when trying to reach EAS officers for advice. This approach increased the awareness and sense of choice among the farmer group as they realized that asynchronous messaging could serve as an alternative practice to relieve some of the problems associated with voice calls. Suranjan then conducted a series of activities that focussed on the information affordances of mobile phones in relation to asynchronous messaging (Fig. 9.3). In taking this step he could assess the individual competencies of the farmers with their phones and was then able to determine what type of digital skills training would be needed prior to piloting a text messaging campaign with this group.

Activity	Tool/feature	Configuration Notes	Test Results
Farmers able to receive massages	Use normal SMS service facilitate by the particular sim service provider	Seed paddy produces in the Galle District western zone	Tested with their mobile phones - √ Eg: Nokia, Samsung, Huawei, Brandtel etc.
Farmers able to know and verifying the massage received from Technical steward	Use phone features	Choose specific massage received alert tone not common for all	Set the receiving tone and tested- √
Farmers able to see the sending massage in their phone screen	Use phone display	Shod be shorten and not include technical jargons. Not too long.	Single massage for single matter.- √ Not good for general answers avoid multiple answers. - √
Farmers able to clean the massage box when it filled	Use phone features to delete inbox familiarized them to massage warning display symbol - phone features	Practice Aware of them about this scenario	Tested with their mobile phones - √

Prototyping and Testing Worksheet

Fig. 9.3 Suranjan's 'Prototyping and Testing Worksheet' used to assess farmers' proficiency in using the information affordances of their mobile phones for asynchronous text messaging

From Information Affordances to Articulation Affordances—Revealing Group Preferences

A technology steward might also adopt a reverse strategy that begins with information affordances but then assesses them against articulation affordances. This can provide valuable insights when it comes to assessing the use and achievement of choice with respect to a specific ICT as taken up in practice. For example, one capping project report revealed how the information affordances of what seemed like an ideal ICT platform did not align well with existing preferences when introduced in a workplace setting.

Antoinette is a researcher and outreach coordinator with the Cocoa Research Centre (CRC) in Trinidad, who participated in the 2019 training at the University of the West Indies. The CRC provides extension services for local farmers and is part of a wider community of practice that includes members involved in cocoa research, production, and marketing. Her campaign attempted to introduce two digital messaging platforms in conjunction with the World Cocoa and Chocolate Day Expo. In a follow-up email with the research team, she described her insights from the experience:

> I think [communications for] the event could have been better managed with ICT, but our team is somewhat in need of convincing (let's say) with regard to the efficacy of it … so I used it and mostly observed others reactions to whenever it was mentioned … I think maybe a less complicated undertaking would be a better candidate for testing out an ICT with my colleagues …

During the planning stage, she had identified the necessary information affordances of the chosen messaging platforms as being relevant to the campaign goal. However, her remarks 'I think maybe a less complicated undertaking would be a better candidate …' indicate that her campaign revealed that group preferences for messaging did not align well with the designed features of the chosen platforms. In other words, the campaign revealed articulation affordances related to the group's preferred messaging practices that did not correspond with Antoinette's initial expectations. No matter how much effort she might have put into training and encouraging her colleagues to use the messaging tools, the communication practices and norms within the group appear not to have aligned well with the information affordances of the ICT tool. Antoinette's evaluation will assist in guiding her future efforts with her team as she now has a greater appreciation for the uncertain relationship between the available choice of ICTs and how these may be taken up to achieve new digital practices in the workplace.

Conclusion

EAS practitioners serve a crucial intermediary role in digitalization of the agricultural sector in the Global South. An interactionist approach to digital literacy will be important to consider as they work with communities of practice to facilitate new

practices involving unfamiliar ICTs. Importantly, the organizational affordances model conceptualizes digital literacy as a dialectical relationship between individual cognitive skills and group-level practices with ICT. Initial results from our work with EAS practitioners in Sri Lanka and Trinidad illustrate how an interactionist approach to digital literacy can inform efforts by EAS organizations to develop training strategies that will include both individual digital literacy training and group-level assessment of digital practices.

Our ongoing research in this area will further introduce and evaluate practical techniques and methods for EAS practitioners to foster situated learning opportunities encompassing both information and articulation affordances as a strategy for digital capabilities development. Future research might also consider how an interactionist view on digital literacy can provide further insights into efforts to apply Kleine's Choice Framework in other settings and to capabilities-oriented ICT4D more generally.

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