Developing a framework for using local knowledge systems to enhance capacity building in agricultural development

Advancements in Agricultural Development
Volume 4, Issue 2, 2023
agdevresearch.org

Developing a Framework for Using Local Knowledge Systems to Enhance Capacity Building in Agricultural Development

T. G. Roberts, S. Cardey[2], P. den Brok[3]

Abstract

Building human capacity through education and training programs is a key component of agricultural development. This article lays out a framework for educators working in agricultural development to use local knowledges to enhance capacity building efforts. Local knowledge systems are complex social phenomena consisting of unique combinations of ontologies/epistemologies, worldviews, and cultures of the people in a particular social/ecological context. To embrace local knowledge systems, educators should: (a) understand power, positionality, and privilege; (b) understand your learners and yourselves; (c) use participatory approaches; and (d) embrace new knowledges. The framework presented provides guidance for agricultural development practitioners; agricultural development organizations; educational institutions and others who train agricultural development practitioners; and researchers and evaluators.

Article History

Received: March 21, 2023
Accepted: April 6, 2023
Published: April 14, 2023

Keywords

indigenous knowledge; education; learning; training

1. T. Grady Roberts, Professor and Distinguished Teaching Scholar, University of Florida, PO Box 110504, Gainesville, FL 32611, groberts@ufl.edu, https://orcid.org/0000-0001-7618-7850
2. Sarah Cardey, Associate Professor, School of Agriculture, Policy and Development, University of Reading, Whiteknights, Reading, RG6 6AH, UK, s.p.cardey@reading.ac.uk, https://orcid.org/0000-0001-8504-8027
3. Perry den Brok, Chair/Full Professor, Wageningen University & Research, Social Sciences Group, P.O. Box 8130, 6700 EW Wageningen (bode 68), perry.denbrok@wur.nl, https://orcid.org/0000-0002-4945-763X

Introduction and Problem Statement

Building human capacity through education and training programs is a key component of agricultural development (Food and Agriculture Organization of the United Nations [FAO], 2010; Tropical Agriculture Platform, 2016). This occurs through *nonformal* programs delivered by Extension or other rural development organizations. It also occurs through *formal* education programs delivered through vocational, secondary, or tertiary education systems. Regardless of the delivery system, both the educator and the curriculum impact outcomes of the educational program (Seidel & Shavelson, 2007). A standardized approach delivered across all settings with all audiences rarely has universal success. Rather, educators, instructional designers, and program planners should consider existing local knowledge systems when developing and delivering educational programs.

Viewing knowledge through a local knowledge systems perspective allows for the consideration of social and ecological variance about *what* people know about a given phenomenon and *how* they know it (Grenier, 1998). Local knowledge systems consist of the unique knowledge developed in a given context over extended periods of time (Naess, 2013). Local knowledge systems account for unique knowledges which individuals or groups of individuals develop in spatially bound settings (Grenier, 1998). Local knowledge systems are inclusive of indigenous knowledge systems, which embrace the ways indigenous peoples understand the world around them (Grenier, 1998). From hereafter, we will use the term *local knowledge systems* as inclusive but acknowledge power differentials which are often associated with indigenous knowledge systems.

Although practitioners may see the value in embracing local knowledge systems, many struggle to do so in practice (Druker-Ibáñez & Cáceres-Jensen, 2022; Thrupp, 1989). This paper presents a framework to guide capacity building efforts in agricultural development by embracing local knowledge systems which can lead to better educational programs, thereby increasing human capacity and addressing the complex problems faced by communities.

Methods

This study employed an integrative literature review process (Torraco, 2005; 2016). Integrative literature reviews allow researchers to use existing scientific literature as data for answering research questions. Based on purpose of this study, a *critical synthesis* of the literature was used to propose new models of the phenomenon being studied (Torraco, 2016). A conceptual structure was used to organize the results (Torraco, 2016).

To begin, key informants with expertise in education, training, and/or development at Wageningen University and Research in The Netherlands, the University of Reading in England, and the University of Florida in the United States were queried about local and indigenous knowledge systems. This generated dozens of concepts which became the initial search phrases to identify relevant literature. A snowballing technique was used to expand the amount of

literature reviewed. In all, hundreds of articles were considered for inclusion, with 85 being selected based on relevance to local knowledge systems and agricultural development. Google Scholar was used due to the inclusive nature search results, allowing representation from researchers in developing countries whose work may not appear in the more exclusive indices.

Findings

Our results are organized into three themes: (a) Theoretical Explanations of Local Knowledge Systems; (b) Dimensions of Local Knowledge Systems; and (c) Strategies for Embracing Local Knowledge Systems in Educational Programs.

Theoretical Explanations of Local Knowledge Systems

The existence of local knowledge systems can be explained using several widely accepted learning theories which focus on how individuals make meaning out of their environment. First, social constructivism (Vygotsky, 1978) outlines how learning is socially constructed based on interactions in the learning environment, with emphasis on language, culture, and the context. The distinctive social and ecological conditions in a local context provide a unique environment for individuals to develop their understandings of the world around them, thus leading to local knowledge systems.

Secondly, social cognitive theory (Bandura, 1997) emphasizes the importance of considering the environment in which learning occurs, especially the other people which co-occupy the learning environment. The development of the individual person is directly influenced by the environment in which they learn (Bandura, 1997). Similarly, situated learning theory (Lave & Wenger, 1991) focuses on how individuals become full members of community through their prolonged engagement in that community. Social cognitive theory and situated learning theory highlight the importance of social interactions and context in learning.

Thirdly, experiential learning theory (Dewey, 1938; Kolb, 2015; Roberts, 2006), adult learning theory (Knowles et al., 2015), and transformative learning theory (Mezirow, 1991) highlight the role of experiences in learning. Experiential learning highlights how new learning builds on prior learning experiences. Adult learning theory emphasizes that prior experiences are critical when facilitating new learning. Transformative learning highlights how critical reflection on some experiences can transform how the individual sees the world around them. Collectively, these three experience-focused theories highlight how shared and individual experiences in a local context contribute to the development of local knowledge systems.

Collectively, these theories create the basis for how local knowledge systems may develop. However, we fully acknowledge that these theories are informed by Western scientific traditions and may not fully frame local knowledge systems. We also acknowledge that our biases as researchers trained in the Western scientific tradition influenced our decision to use these theories to help explain local knowledge systems.

Dimensions of Local Knowledge Systems

Local knowledge systems are complex social phenomena bound in social/ecological contexts. Our research showed that local knowledge systems consist of unique combinations of three interrelated dimensions: ontologies/epistemologies, worldviews, and cultures of the people in a social/ecological context. Culture appears to be the broader dimension which includes worldviews and ontologies/epistemologies.

Ontology/Epistemology

A discussion of knowledge must begin by considering ontology and epistemology. Ontology focuses on the nature of what exists, whereas epistemology is a philosophical way of explaining what can be considered legitimate knowledge (Crotty, 1998). Crotty differentiates the two by saying *ontology* focuses on "what is" and *epistemology* focuses on "what it means to know" (Crotty, 1998, p. 10). The two concepts are often linked together and can be confusing (Crotty, 1998). Ontology is often expressed on a continuum of realism to relativism (Guba & Lincoln, 2005). A realist ontology assumes an external reality which exists independent of a person, whereas a relativist ontology assumes reality depends on peoples' interpretations. Epistemologies fall into variants of objectivism, constructionism, and subjectivism (Crotty, 1998). Objectivism explains knowledge as being independent of any human consciousness and thus existing objectively in the world. Constructionism emphasizes that human interactions with phenomena in the world allow for the construction of knowledge. Subjectivism stresses that knowledge or meaning for a given phenomenon is imposed on by humans without interaction with the phenomenon. Local knowledge systems can be based on realist or relativist ontologies and any of these epistemologies. This may differ from the Western scientific training of many agricultural development practitioners, which is often rooted in a realist ontology and objectivist epistemology (Aikenhead & Ogawa, 2007; Conner et al., 2013).

Worldviews

A worldview captures how an individual views the world around them (Hart, 2010). Olsen et al. (1992) described worldviews as mental lenses used by people to perceive the world. Operationalizing worldviews can be quite challenging, as numerous scholars from a variety of academic disciplines have studied this concept. Koltko-Rivera (2004) presents a very comprehensive examination of worldviews from a psychological perspective. A worldview is a person's individual interpretation of reality, is quite complex, and consists of many dimensions (Koltko-Rivera, 2004). Koltko-Rivera (2004) synthesized the literature and presented a model which includes 42 dimensions organized into seven groups. Among these dimensions are ontology, knowledge (epistemology), agency, deity (spirituality), morality, and relationships. Differences in worldview are often expressed in the relational dimensions of individualism or collectivism (Williams, 2003). Worldviews are often used as a tool to study different cultures, as members of a culture share similar worldviews (Cobern, 1996).

The importance of considering worldviews has been frequently considered in agricultural development efforts. Worldviews of indigenous communities may differ from non-indigenous communities (Hart, 2010). For example, Western worldviews were inadequate to understand sustainability competencies among indigenous groups in Ethiopia (Demssie et al., 2020) and

First Nation groups in Canada (Castleden et al., 2009). There is growing interest in embracing differing worldviews by decolonizing knowledge systems and the power structures associated with Western scientific knowledge (Apffel-Marglin & Marglin, 1996; Cummings et al., 2022). Worldviews are also linked with how people perceive the importance of ecosystem services (Wardropper et al., 2020). The worldviews of people in a local area may differ than agricultural development practitioners.

Culture

As noted above, culture is often studied through a lens of worldviews, and considerable overlap exists. Culture is a complex term with dozens of definitions in the literature often with nuanced differences based on sociological, psychological, or anthropological traditions (Jahoda, 2012). Most definitions include something about common attributes shared by a group of people, although there is no universally agreed set of attributes. As an example, Delaney (2011) proposed a framework of eight elements which define a culture. These include: (a) space; (b) time; (c) language; (d) relatives and relations; (e) our bodies; (f) food; (g) clothing; and (h) important people, places, and performances (Delaney, 2011). As another example, Hofstede et al (2010) presented six factors: (a) power distance; (b) uncertainty avoidance; (c) individualism versus collectivism; (d) masculinity versus femininity; (e) long term versus short term orientation; and (f) indulgence versus restraint. The term culture has been used to describe various size groups including: (a) smaller groups like sports teams and specific organizations; (b) intermediate size groups like villages and regions/provinces; and (c) large groups of people like citizens from the same country and transnational ethnic groups (e.g., Latin Americans).

Culture has been connected to agricultural development practices in several ways. Local culture has been linked to agricultural practices unique to a specific location (Koohafkan & Altieri, 2016), and culture is often interconnected with food (Delaney, 2011; Sumner et al., 2010). The importance of culture is also associated with the conservation of agricultural biodiversity in developed and developing countries (Castleden et al., 2009; Shepherd, 2010). Culture is also connected with how indigenous knowledge is shared in various communities (Lwoga et al., 2010a). Failure to consider local cultures has been shown as a factor in the failure of agricultural development efforts (Pawluk et al., 1992). Agricultural development practitioners should understand that many cultures may exist in a local area and differ from their own culture.

Strategies for Embracing Local Knowledge Systems in Educational Programs

Understanding local knowledge systems is the first step. The second step is embracing local knowledges when developing and delivering educational programs. Doing so may require educators to rethink their approach to teaching by crossing boundaries (Akkerman & Bakker, 2011). Crossing boundaries requires identification, coordination, reflection, and transformation (Akkerman & Bakker, 2011). Our research identified four boundary crossing strategies for educators: (a) understand your learners and yourself; (b) embrace new knowledge; (c) understand power, positionality, and privilege; and (d) use participatory approaches.

Understand Your Learners & Yourself

A critical step to embrace local knowledge is to invest effort in really understanding the learners, including their epistemologies; their worldviews; their cultures; and the power, positionality, and privileges within the given social system (Brouwer et al., 2015; Castagno & Brayboy, 2008; Demssie et al., 2020; Wahlgren, 2016). Within a larger educational program, this may be framed as understanding the context (Brouwer et al., 2015). In general, understanding the learners is a prerequisite to being learner-centered (Engel & van den Bor, 2008). Understanding learners also allows for the design of much more meaningful learning experiences which build off local knowledge (Merriam, 2018). Agricultural development professionals acknowledge the importance of being learner-centered (Conner et al., 2013; Ghimire & Martin, 2012).

Understanding your learners can be more complex than it might first seem. First, local knowledge may not be shared equally across all members of a community (Briggs, 2005) and some knowledge may be tacit (Lwoga et al., 2010b). Further complicating the situation, some marginalized learners may not be heard (Kantor et al., 2015), and gender differences may be present (Belenky et al., 1986; Briggs, 2005). Some communities may have gatekeepers, which could control access to some groups of learners (Broekel & Mueller, 2018). Additionally, understanding what your learners know is not static as local knowledge changes over time (Briggs, 2005). Understanding the learners also means understanding the underlying structural conditions in which they live and work (Hermans et al., 2015).

Needs assessments are commonly used to understand the current situation and learner needs (Dooley et al., 2018), but efforts should be made to gain input from all stakeholders, not just the most accessible ones (Stufflebeam et al., 2012). Implementing participatory approaches also allow the educator to understand learners through frequent interactions (Chambers, 1994; Engel & van den Bor, 2008; Grenier, 1998) by a process of socialization and knowledge sharing (Lwoga et al., 2010b). Understanding individual learners also means understanding the broader context. Common tools include historical analysis, stakeholder analysis, participatory engagement, and participatory observation (Hermans et al., 2015; Middelveld et al., 2021).

It is also important for educators to understand themselves, including their epistemologies; their worldviews; their own culture; and the power, positionality, and privileges they bring to the local learning environment (Merriam, 2018; Sparks & Butterwick, 2020; Wahlgren, 2016). This can occur through an on-going critical self-reflection (Schön, 2017). Educators should recognize that their approaches to teaching are often informed by their own beliefs, values, and experiences (Heimlich & Norland, 2002), and those may differ from the learners in the local context. It is also important for agricultural development practitioners to consider how their connection a given organization, institution, or funding agency can impact power, positionality, and privilege (Cummings et al., 2022). As noted earlier, cultural differences may exist and educators should understand that cross-cultural communication could present challenges in understanding (Druker-Ibáñez & Cáceres-Jensen, 2022). Educators should engage in critical self-reflection as part of the iterative planning process for an educational program.

Embrace New Knowledge

Understanding local knowledge systems requires educators to embrace new knowledge. This means not applying Western standards to evaluate local knowledge (Thrupp, 1989). Educators should move beyond an either/or approach to comparing local knowledge with Western scientific knowledge (Aikenhead & Ogawa, 2007; Briggs, 2005; Connell, 2020) and seek to understand the complementary relationship among diverse knowledge systems (Castagno & Brayboy, 2008). Educators should shift mindsets from separate knowledge systems to knowledge integration (Chapman & Scott, 2020; Druker-Ibáñez & Cáceres-Jensen, 2022). This means moving beyond understanding to applying that knowledge in "joint learning processes" (Tengö et al., 2017, p. 24). Embracing new knowledge may require educators to view themselves as co-learners in the process, rather than the expert source of information.

Understand Power, Positionality, & Privilege

Power, positionality, and privilege are social constructs which differentiate people. Power and positionality are present any time two people interact (Merriam et al., 2001). Numerous theories about *power* exist, but the work of French and Raven (1959) is frequently cited. Power is the ability of one person to influence the behavior of another person (French & Raven, 1959). In this seminal work, the authors describe five types of power: legitimate, reward, expert, referent, and coercive. They later added a sixth power, informational (Raven, 1965). Legitimate power means the person has the right to make demands on others. Reward power is when the person can compensate others. Expert power is based on the person's level of competence. Referent power is based on interpersonal skills. Coercive power is the ability to punish others. Informational power comes from the ability to control information (Raven, 1965). Understanding power and empowerment are critical for development interventions (Rowlands, 1995).

The concept of *positionality* is informed by positioning theory (Harré & Langenhove, 1991) which explains how an individual is placed within a given social discourse. People can be self-positioned (i.e., they define their role in a given interaction) or they can be positioned by others (Harré & Langenhove, 1991). The way individuals are positioned influences the actions they take in a given situation (Harré et al., 2009).

Privilege occurs when one group of people have advantages over another group of people based on some aspect of social identity (Black & Stone, 2005; Du Bois, 2001). Privilege can be based on race/ethnicity, gender, sexual orientation, social economic status, age, ableness/disability, religion, education, and other social identities (Black & Stone, 2005). Sometimes a person may be in a position of privilege based on one identity (e.g., race) but in a disadvantaged position based on another identity (e.g., gender). Crenshaw (1989) used the term *intersectionality* to describe this situation. Gender has long been linked to power and privilege, with men typically having the advantage (Halford, 2001; Moser, 1989).

Education and training programs can be viewed as a means of elevating or emancipating groups people who may be disadvantaged in a given context (Freire, 2007). Scholars use the term *colonization of knowledge* to describe how colonizers imposed Western knowledge systems in

the regions they colonized (Mignolo, 2007). Efforts to address this situation are often called the *decolonization of knowledge* (Apffel-Marglin & Marglin, 1996; Cummings et al., 2022). Many agricultural development efforts occur in post-colonial regions in Africa, Latin America, and Asia where food insecurity is most severe (Townsend, 2015). Many of these efforts are also funded by governments, NGOs, and companies from nations in the Global North who were once colonizers (Alston et al., 2000; van Wessell, 2021). Some of these regions were also characterized by one group of people (often the colonizer) oppressing other people (Memmi, 1991; Middelveld et al., 2021). Other agricultural development efforts seek to improve the conditions of marginalized people, even within the most developed countries (Coté, 2016).

Given this situation, agricultural development practitioners should consider their own power, positionality, and privilege as well as differences in power, positionality, and privilege within groups of people from a given local context. Agricultural development practitioners should be aware that power and positionality are present in all cross-cultural communication (Merriam et al., 2001). Power and positionality are also present in insider/outsider situations (Merriam et al., 2001). Sometimes marginalized people go unheard without targeted efforts to give them a voice (Kantor et al., 2015). As an example, failing to address gender negatively impacts of agricultural development efforts (Kristjanson et al., 2017). Agricultural development practitioners should also consider that policy-making decisions in agricultural development efforts are often limited to the people with power in a given context (Yami et al., 2019).

Use Participatory Approaches

Participatory approaches have long been advocated in agricultural development work under labels like Participatory Rural Appraisal (PRA) (Chambers, 1994; Engel & van den Bor, 2008; Grenier, 1998) and Multi-Stakeholder Platforms (MSP) (Brouwer et al., 2015). The general premise is that people are involved in decisions about their learning (Thrupp, 1989). This occurs best when educators create opportunities for learners to engage with each other and with the content (Demssie et al., 2020). Participatory learning approaches can be an effective approach to teach groups with differing worldviews (Grudens-Schuck, 2000). As an example, Jordan et al. (2008) highlighted how scenario planning can be a valuable participatory tool for embracing learners with differing worldviews. However, as we noted earlier, power and privilege must be considered and may impact equal participation (Cooke & Kothari, 2001).

PRA describes a variety of related development approaches whereby local people actively participate in the discovery of solutions for the problems faced in their communities (Chambers, 1994; Grenier, 1998). PRA evolved from Rapid Rural Appraisal (RRA), with the biggest distinction being that PRA empowers local people to be involved in the process and RRA relies on outside assessments (Chambers, 1994). More recently, PRA has been called Participatory Learning and Action (PLA) (Narayanasamy, 2009). A wide variety of PRA tools and methods can be used (see Grenier, 1998; Narayanasamy, 2009). A general feature of PRA techniques is that local people are trained or guided in collecting, analyzing, and interpreting a variety of different kinds of data and then use that data to develop solutions to problems.

The Multi Stakeholder Platform (MSP) is a participatory problem-solving approach established at Wageningen University and Research (Brouwer et al., 2015). MSPs are viewed as a form of governance where groups of people come together to make collaborative decisions about complex issues. MSPs typically go through a cyclical process which includes: (a) initiating, (b) adaptive planning, (c) collaborative action, and (d) reflective monitoring (Brouwer et al., 2015). As the name implies, MSPs involve diverse groups of stakeholders at every stage.

Participatory approaches have been successfully used for an array of agricultural development challenges, including scaling of agricultural innovations (Wigboldus et al., 2016), restoring forests (McLain et al., 2021), addressing water insecurity (Quentin Grafton, 2017), capacity building of farmers (Ochago et al., 2023), and developing sustainable agri-food value chains (Pancino et al., 2019). Some noted weaknesses in participatory approaches include power dynamics among participants, ineffective training to implement participatory methods, and unclear/ill-defined goals for the program (Grenier, 1998).

Using participatory approaches requires a mind shift to embrace a bottom-up approach which leads to developing and delivering educational programs which appropriately consider local knowledge based on a deep understanding of the local context (Jovchelovitch, 2007; Thrupp, 1989). Researchers express this approach using phrases like consider the needs of local people (Thrupp, 1989), use indigenous knowledge (Demssie et al., 2020), connect to everyday life (Castagno & Brayboy, 2008), and build on learners' experiences (Demssie et al., 2020). Researchers also emphasize the importance of situating learning within context (Jovchelovitch, 2007; Lave & Wenger, 1991) and the presence of context-specific knowledge networks (Davidson-Hunt & O'Flaherty, 2007). Other researchers found it important to consider place-based education (Barnhardt & Oscar Kawagley, 2008) and learning communities (Davidson-Hunt & O'Flaherty, 2007). By using a bottom-up approach, "capacity building can start to confront inequalities and shift dominant power dynamics" (Ziervogel et al., 2022, p. 607).

Implementing a bottom-up approach means that educators should enter the learning environment seeking to understand and work with learners to co-create knowledge necessary to address whatever problems are being faced (Armitage et al., 2011). Within a context of sustainability, Tengö et al. (2017) used the phrase *bridging knowledge systems* to emphasize the co-creation of knowledge. They emphasized the importance of considering the social networks of actors within the system, the local institutions, and the processes for collaboration (Tengö et al., 2017). These researchers propose five tasks for bridging knowledge systems: (a) mobilize the actors in the local system to start gathering evidence of local knowledge, (b) translate the gathered knowledge in ways which local actors can understand, (c) negotiate among local actors to create useful representations of knowledge, (d) synthesize the accepted local knowledge to inform the overall purpose, and (e) apply the local knowledge to take action (Tengö et al., 2017).

Using participatory approaches means it is inappropriate to use pre-prepared programs and curricula developed without input from local partners (Campbell & Burnaby, 2005). Educators and program planners should focus their advanced efforts on developing collaborative

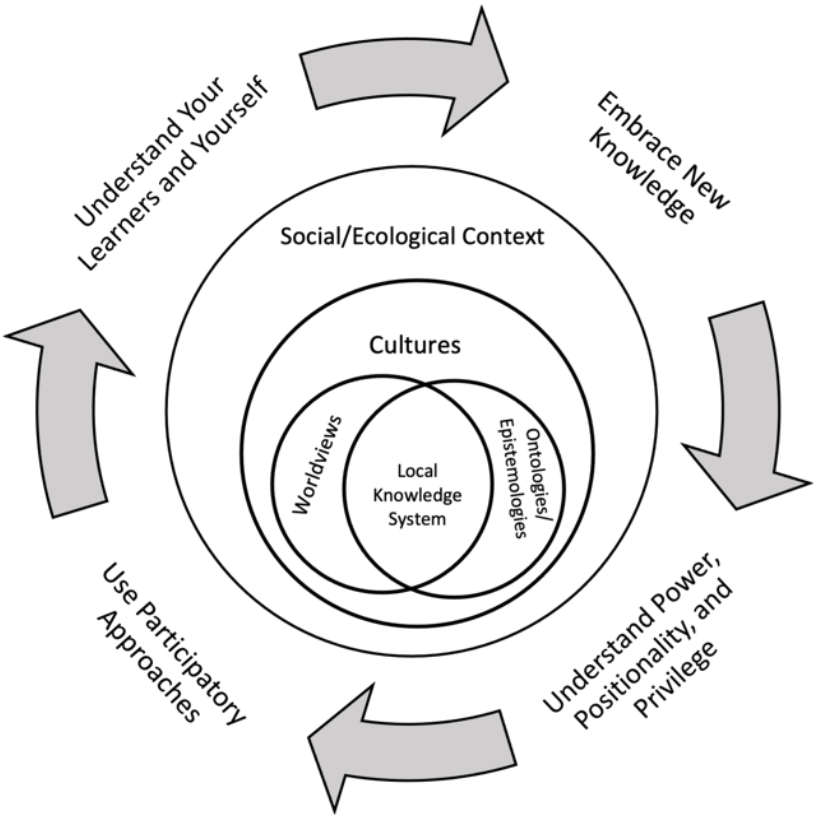
processes, rather than on content (Campbell & Burnaby, 2005). As noted previously, this may require additional training for agricultural development practitioners (Grenier, 1998).

Conclusions, Discussion, and Recommendations

This article lays out a framework to improve capacity building efforts in agricultural development by considering local knowledge systems (see Figure 1). The center explains local knowledge systems. The outer ring provides strategies for educators working in agricultural development. Agricultural development *practitioners* should examine their current practices using this framework. Agricultural development *organizations* should examine their approaches to program development to ensure local knowledge systems are adequately addressed. *Educational institutions* and others who train agricultural development practitioners should ensure their programs adequately address local knowledge systems. *Researchers and evaluators* can use this framework to investigate local knowledge systems and program outcomes.

Figure 1

A Framework for Using Local Knowledge Systems to Inform Agricultural Development Practices



Acknowledgements

This research was supported with funds from the University of Florida, UF/IFAS, and USDA/NIFA Hatch Project FLA-AEC-006179.

Author Contributions: G. Roberts – conceptualization, formal analysis, investigation, writing-original draft; **S. Cardey** – writing-review and editing; **P Brok** – writing-review and editing

References

Aikenhead, G. S., & Ogawa, M. (2007). Indigenous knowledge and science revisited. *Cultural Studies of Science Education*, *2*(3), 539-620. https://doi.org/10.1007/s11422-007-9067-8

Akkerman, S. F., & Bakker, A. (2011). Boundary crossing and boundary objects. *Review of Educational Research*, *81*(2), 132-169. https://doi.org/10.3102/0034654311404435

Alston, J. M., Chan-Kang, C., Marra, M. C., Pardey, P. G., & Wyatt, T. J. (2000). *A meta-analysis of rates of return to agricultural R&D: Ex pede Herculem?* (Vol. 113). International Food Policy Research Institute. https://www.ifpri.org/publication/meta-analysis-rates-return-agricultural-r-d

Apffel-Marglin, F., & Marglin, S. A. (Eds.). (1996). *Decolonizing knowledge: From development to dialogue*. Clarendon Press.

Armitage, D., Berkes, F., Dale, A., Kocho-Schellenberg, E., & Patton, E. (2011). Co-management and the co-production of knowledge: Learning to adapt in Canada's Arctic. *Global Environmental Change*, *21*(3), 995-1004. https://doi.org/10.1016/j.gloenvcha.2011.04.006

Bandura, A. (1997). *Self-efficacy: The exercise of control.* W. H. Freeman and Company.

Barnhardt, R., & Oscar Kawagley, A. (2005). Indigenous knowledge systems and Alaska Native ways of knowing. *Anthropology & Education Quarterly*, *36*(1), 8-23. https://doi.org/10.1525/aeq.2005.36.1.008

Belenky, M. F., Clinchy, B., Goldberger, N. R., & Tarule, J. M. (1986). *Women's ways of knowing: The development of self, voice, and mind*. Basic Books.

Black, L. L., & Stone, D. (2005). Expanding the definition of privilege: The concept of social privilege. *Journal of Multicultural Counseling and Development*, *33*(4), 243-255. https://doi.org/10.1002/j.2161-1912.2005.tb00020.x

Briggs, J. (2005). The use of indigenous knowledge in development: Problems and challenges. *Progress in Development Studies*, *5*(2), 99-114. https://doi.org/10.1191/1464993405ps105oa

Broekel, T., & Mueller, W. (2018). Critical links in knowledge networks–What about proximities and gatekeeper organisations? *Industry and Innovation*, *25*(10), 919-939. https://doi.org/10.1080/13662716.2017.1343130

Brouwer, H., Woodhill, J., Hemmati, M., Verhoosel, K., & van Vugt, S. (2015). *The MSP guide: How to facilitate multi-stakeholder partnerships*. Practical Action Publishing. https://edepot.wur.nl/358948

Campbell, P., & Burnaby, B. (Eds.). (2005). *Participatory practices in adult education*. Routledge.

Castagno, A. E., & Brayboy, B. M. J. (2008). Culturally responsive schooling for indigenous youth: A review of the literature. *Review of Educational Research*, *78*(4), 941-993. https://doi.org/10.3102/0034654308323036

Castleden, H., Garvin, T., & Nation, H. A. A. F. (2009). "Hishuk Tsawak" (everything is one/connected): A Huu-ay-aht worldview for seeing forestry in British Columbia, Canada. *Society and Natural Resources*, *22*(9), 789-804. https://doi.org/10.1080/08941920802098198

Chambers, R. (1994). The origins and practice of participatory rural appraisal. *World Development*, *22*(7), 953-969. https://doi.org/10.1016/0305-750X(94)90141-4

Chapman, J. M., & Schott, S. (2020). Knowledge coevolution: Generating new understanding through bridging and strengthening distinct knowledge systems and empowering local knowledge holders. *Sustainability Science*, *15*(3), 931-943. https://doi.org/10.1007/s11625-020-00781-2

Cobern, W. W. (1996). Worldview theory and conceptual change in science education. *Science Education, 80*(5), 579-610. https://doi.org/10.1002/(SICI)1098-237X(199609)80:5%3C579::AID-SCE5%3E3.0.CO;2-8

Connell, R. (2020). *Southern theory: The global dynamics of knowledge in social science*. Routledge. https://doi.org/10.4324/9781003117346

Conner, N. W., Roberts, T. G., & Harder, A. (2013). Competencies and experiences needed by entry level international agricultural development practitioners. *Journal of International Agricultural and Extension Education*, *20*(1), 19–32.

Cooke, B., & Kothari, U. (Eds.). (2001). *Participation: The new tyranny?*. Zed books.

Coté, C. (2016). "Indigenizing" food sovereignty: Revitalizing indigenous food practices and ecological knowledges in Canada and the United States. *Humanities*, *5*(3), 57. https://doi.org/10.3390/h5030057

Crenshaw, K. (1989). Demarginalizing the intersection of race and sex: A black feminist critique of antidiscrimination doctrine, feminist theory and antiracist politics. *University of Chicago Legal Forum, 1989*, Article 8. https://chicagounbound.uchicago.edu/uclf/vol1989/iss1/8

Crotty, M. (1998). *The foundations of social research*. Sage.

Cummings, S., Munthala, N., & Sharpland, P. (2022). A systemic approach to the knowledge decolonization: Implications for scholars of development studies. In D. Ludwig, B. Boogaard, & C. Leeuwis (Eds.), *The politics of knowledge in inclusive development and innovation* (pp. 65-79). Routledge. https://doi.org/10.4324/9781003112525

Davidson-Hunt, I. J., & Michael O'Flaherty, R. (2007). Researchers, indigenous peoples, and place-based learning communities. *Society and Natural Resources*, *20*(4), 291-305. https://doi.org/10.1080/08941920601161312

Delaney, C. (2011). *Investigating culture: An experiential introduction to anthropology* (2nd ed.). Wiley-Blackwell.

Demssie, Y. N., Biemans, H. J. A., Wesselink, R., & Mulder, M. (2020). Combining indigenous knowledge and modern education to foster sustainability competencies: Towards a set of learning design principles. *Sustainability*, *12*(17), 6823. https://doi.org/10.3390/su12176823

Dewey, J. (1938). *Experience and education.* Simon & Schuster.

Dooley, K. E., Dobbins, C., & Edgar, L. D. (2018). Using participatory rural appraisal for a community needs assessment in Timor-Leste. *Journal of International Agricultural and Extension Education*, *25*(4), 63-73.

Druker-Ibáñez, S., & Cáceres-Jensen, L. (2022). Integration of indigenous and local knowledge into sustainability education: A systematic literature review. *Environmental Education Research*, *28*(8), 1209-1236. https://doi.org/10.1080/13504622.2022.2083081

Du Bois, W. B. (2001). Black reconstruction in America, 1860-1880. *Racism Essential Readings*, 27-34.

Engel, P. G. H., & van den Bor, W. (1995). Agricultural education from a knowledge systems perspective: From teaching to facilitating joint inquiry and learning. *European Journal of Agricultural Education and Extension*, *1*(4), 1-23. https://doi.org/10.1080/13892249485300311

Food and Agriculture Organization of the United Nations. (2010). *Learning module 1: Enhancing FAO's practices for supporting capacity development of member countries*. Rome. https://www.fao.org/3/i1998e/i1998e.pdf

Freire, P. (2007). *Pedagogy of the oppressed*. Continuum.

French, J. R. P., Jr., & Raven., B. H. (1959). The bases of social power. In D. Cartwright (Ed.). *Studies in social power* (pp. 150-167). University of Michigan Press.

Ghimire, N. R., & Martin, R. A. (2012). Learning systems competencies: Their importance to extension educators. *International Journal of Learning Annual Review*, *18*(3), 95-112. https://doi.org/10.18848/1447-9494/CGP/v18i03/47512

Grenier, L. (1998). *Working with indigenous knowledge: A guide for researchers*. International Development Research Centre.

Grudens-Schuck, N. (2000). Extension and grassroots educators' approaches to participatory education: Interrelationships among training, worldview, and institutional support. *Adult Education Research Conference*. https://newprairiepress.org/aerc/2000/papers/29

Guba, E. G., & Lincoln, Y. S. (2005). Paradigmatic controversies, contradictions, and emerging confluences. In N. K. Denzin & Y. S. Lincoln (Eds.), *The Sage handbook of qualitative research* (pp. 191–215). Sage.

Halford, S. (2001). *Gender, power and organisations: An introduction*. Bloomsbury Publishing.

Harré, R., Moghaddam, F. M., Cairnie, T. P., Rothbart, D., & Sabat, S. R. (2009). Recent advances in positioning theory. *Theory & Psychology, 19*(1), 5–31. https://doi.org/10.1177/0959354308101417

Harré, R., & Van Langenhove, L. (1991). Varieties of positioning. *Journal for the Theory of Social Behaviour*, *21*(4), 393-407. https://psycnet.apa.org/doi/10.1111/j.1468-5914.1991.tb00203.x

Hart, M. A. (2010). Indigenous worldviews, knowledge, and research: The development of an indigenous research paradigm. *Journal of Indigenous Voices in Social Work, 1*(1), 1-16. https://journalhosting.ucalgary.ca/index.php/jisd/article/view/63043

Heimlich, J. E., & Norland, E. (2002). Teaching style: Where are we now? *New Directions for Adult and Continuing Education*, *2002*(93), 17-26. https://doi.org/10.1002/ace.46

Hermans, F., Klerkx, L., & Roep, D. (2015). Structural conditions for collaboration and learning in innovation networks: Using an innovation system performance lens to analyse agricultural knowledge systems. *The Journal of Agricultural Education and Extension*, *21*(1), 35-54. https://doi.org/10.1080/1389224X.2014.991113

Hofstede, G., Hofstede, G. J. & Minkov, M. (2010). *Cultures and organizations: Software of the mind* (3rd ed.). McGraw-Hill.

Jahoda, G. (2012). Critical reflections on some recent definitions of "culture." *Culture & Psychology, 18*(3), 289-303. https://doi.org/10.1177/1354067X12446229

Jordan, N. R., Bawden, R. J., & Bergmann, L. (2008). Pedagogy for addressing the worldview challenge in sustainable development of agriculture. *Journal of Natural Resources and Life Sciences Education, 37*(1), 92-99. https://doi.org/10.2134/jnrlse2008.37192x

Jovchelovitch, S. (2007). *Knowledge in context: Representations, community and culture*. Routledge. https://doi.org/10.4324/9780203968895

Kantor, P., Morgan, M., & Choudhury, A. (2015). Amplifying outcomes by addressing inequality: The role of gender-transformative approaches in agricultural research for development. *Gender, Technology and Development*, *19*(3), 292-319. https://doi.org/10.1177/0971852415596863

Knowles, M. S., Holton III, E. F., Swanson, R. A. (2015). *The adult learner: The definitive classic in adult education and human resource development* (8th ed.). Routledge.

Kolb, D. A. (2015). *Experiential learning: Experience as the source of learning and development* (2nd ed.). Pearson.

Koltko-Rivera, M. E. (2004). The psychology of worldviews. *Review of General Psychology, 8*(1), 3-58. https://doi.org/10.1037/1089-2680.8.1.3

Koohafkan, P., & Altieri, M.A. (2016). *Forgotten agricultural heritage: Reconnecting food systems and sustainable development*. Routledge. https://doi.org/10.4324/9781315470092

Kristjanson, P., Bryan, E., Bernier, Q., Twyman, J., Meinzen-Dick, R., Kieran, C., Ringler, C., Jost, C., & Doss, C. (2017). Addressing gender in agricultural research for development in the face of a changing climate: Where are we and where should we be going? *International Journal of Agricultural Sustainability*, *15*(5), 482-500. https://doi.org/10.1080/14735903.2017.1336411

Lave, J., & Wenger, E. (1991). *Situated learning: Legitimate peripheral participation*. Cambridge university press. https://psycnet.apa.org/doi/10.1017/CBO9780511815355

Lwoga, E. T., Ngulube, P., & Stilwell, C. (2010a). Managing indigenous knowledge for sustainable agricultural development in developing countries: Knowledge management approaches in the social context. *The International Information & Library Review*, *42*(3), 174-185. https://doi.org/10.1016/j.iilr.2010.07.006

Lwoga, E. T., Ngulube, P. & Stilwell, C. (2010b). Understanding indigenous knowledge: Bridging the knowledge gap through a knowledge creation model for agricultural development. *SA Journal of Information Management, 12*(1), Art. #436. https://doi.org/10.4102/sajim.v12i1.436

McLain, R., Lawry, S., Guariguata, M. R., & Reed, J. (2021). Toward a tenure-responsive approach to forest landscape restoration: A proposed tenure diagnostic for assessing restoration opportunities. *Land Use Policy*, *104*, 103748. https://doi.org/10.1016/j.landusepol.2018.11.053

Memmi, A. (1991). *The colonizer and the colonized*. Routledge.

Merriam, S. B. (2018). Adult learning theory: Evolution and future directions. In K. Illeris (Ed.), *Contemporary theories of learning* (pp. 83-96). Routledge. https://doi.org/10.4324/9781315147277

Merriam, S. B., Johnson-Bailey, J., Lee, M., Kee, Y., Ntseane, G., & Muhamad, M. (2001). Power and positionality: Negotiating insider/outsider status within and across cultures. *International Journal of Lifelong Education*, *20*(5), 405-416. https://doi.org/10.1080/02601370120490

Mezirow, J. (1991). *Transformative dimensions of adult learning*. Jossey-Bass.

Middelveld, S., Maat, H., & Macnaghten, P. (2021). Making knowledge from below. In D. Ludwig, B. Boogaard, Macnaghten, P., & C. Leeuwis (Eds.), *The politics of knowledge in inclusive development and innovation* (pp. 34-47). Routledge. https://doi.org/10.4324/9781003112525

Mignolo, W. D. (2007). Introduction: Coloniality of power and de-colonial thinking. *Cultural Studies, 21*(2-3), 155-167. https://doi.org/10.1080/09502380601162498

Moser, C. O. N. (1989). Gender planning in the Third World: Meeting practical and strategic gender needs. *World Development, 17*(11), 1799-1825. https://doi.org/10.1016/0305-750X(89)90201-5

Naess, L. O. (2013). The role of local knowledge in adaptation to climate change. *Wiley Interdisciplinary Reviews: Climate Change, 4*(2), 99-106. https://doi.org/10.1002/wcc.204

Narayanasamy, N. (2009). *Participatory rural appraisal: Principles, methods and application*. SAGE Publications India.

Ochago, R., Dentoni, D., Lans, T., & Trienekens, J. (2023. Disentangling the experiential learning process of coffee farmers in Uganda's innovation platforms. *The Journal of Agricultural Education and Extension*, *29*(1) 117-148. https://doi.org/10.1080/1389224X.2021.1977664

Olsen, M. E., Lodwick, D. G., & Dunlap, R. E. (1992). *Viewing the world ecologically*. Westview Press.

Pancino, B., Blasi, E., Rappoldt, A., Pascucci, S., Ruini, L., & Ronchi, C. (2019). Partnering for sustainability in agri-food supply chains: The case of Barilla Sustainable Farming in the Po Valley. *Agricultural and Food Economics*, *7*(1), 1-10. https://doi.org/10.1186/s40100-019-0133-9

Pawluk, R. R., Sandor, J. A., & Tabor, J. A. (1992). The role of indigenous soil knowledge in agricultural development. *Journal of Soil and Water Conservation*, *47*(4), 298-302. https://www.jswconline.org/content/47/4/298

Quentin Grafton, R. (2017). Responding to the 'wicked problem' of water insecurity. *Water Resources Management*, *31*(10), 3023-3041. https://doi.org/10.1007/s11269-017-1606-9

Raven, B. H. (1965). Social influence and power. In I. D. Steiner & M. Fishbein (Eds.), *Current studies in social psychology* (pp. 371–382). Holt, Rinehart, Winston.

Roberts, T. G. (2006). A philosophical examination of experiential learning theory for agricultural educators. *Journal of Agricultural Education, 47*(1), 17–29. https://doi.org/10.5032/jae.2006.01017

Rowlands, J. (1995). Empowerment examined. *Development in Practice*, *5*(2), 101-107. https://doi.org/10.1080/0961452951000157074

Schön, D. A. (2017). *The reflective practitioner: How professionals think in action*. Routledge.

Seidel, T., & Shavelson, R. J. (2007). Teaching effectiveness research in the past decade: The role of theory and research design in disentangling meta-analysis results. *Review of Educational Research*, *77*(4), 454-499. https://doi.org/10.3102/0034654307310317

Shepherd, C. J. (2010). Mobilizing local knowledge and asserting culture: The cultural politics of in situ conservation of agricultural biodiversity. *Current Anthropology*, *51*(5), 629-654. https://doi.org/10.1086/656424

Sparks, B., & Butterwick, S. (2020). Culture, equity and learning. In G. Foley (Ed.), *Dimensions of adult learning* (pp. 276-289). Routledge.

Stufflebeam, D. L., McCormick, C. H., Brinkerhoff, R. O., & Nelson, C. O. (2012). *Conducting educational needs assessments* (Vol. 10). Springer Science & Business Media.

Sumner, J., Mair, H., & Nelson, E. (2010). Putting the culture back into agriculture: Civic engagement, community and the celebration of local food. *International Journal of Agricultural Sustainability, 8*(1-2), 54-61. https://doi.org/10.3763/ijas.2009.0454

Tengö, M., Hill, R., Malmer, P., Raymond, C. M., Spierenburg, M., Danielsen, F., Elmgvist, T., & Folke, C. (2017). Weaving knowledge systems in IPBES, CBD and beyond—lessons learned for sustainability. *Current Opinion in Environmental Sustainability*, *26-27*, 17-25. https://doi.org/10.1016/j.cosust.2016.12.005

Thrupp, L. A. (1989) Legitimizing local knowledge: From displacement to empowerment for third world people. *Agriculture and Human Values, 6*(3), 13–24. https://doi.org/10.1007/BF02217665

Torraco, R. J. (2005). Writing integrative literature reviews: Guidelines and examples. *Human Resource Development Review, 4*(3), 356–367. https://doi.org/10.1177/1534484305278283

Torraco, R. J. (2016). Writing integrative literature reviews: Using the past and present to explore the future. *Human Resource Development Review, 15*(4), 404–428. https://doi.org/10.1177/1534484316671606

Townsend, R. (2015, April 1). *Ending poverty and hunger by 2030: An agenda for the global food system*. World Bank Group. http://documents.worldbank.org/curated/en/700061468334490682/Ending-poverty-and-hunger-by-2030-an-agenda-for-the-global-food-system

Tropical Agriculture Platform. (2016). *Common framework for capacity development for agricultural innovation systems*. CABI. https://cdais.net/wp-content/uploads/2016/02/Guidance-note.pdf

van Wessell, M. (2021). The politics of evidence-based advocacy by civil society organization. In D. Ludwig, B. Boogaard, & C. Leeuwis (Eds.), *The politics of knowledge in inclusive development and innovation* (pp. 181-195). Routledge. https://doi.org/10.4324/9781003112525

Vygotsky, L. (1978). *Mind in society: The development of higher psychological processes.* Harvard University Press.

Wahlgren, B. (2016). Adult educators' core competences. *International Review of Education*, *62*(3), 343-353. https://doi.org/10.1007/s11159-016-9559-4

Wardropper, C. B., Mase, A. S., Qiu, J., Kohl, P., Booth, E. G., & Rissman, A. R. (2020). Ecological worldview, agricultural or natural resource-based activities, and geography affect perceived importance of ecosystem services. *Landscape and Urban Planning*, 197, 103768. https://doi.org/10.1016/j.landurbplan.2020.103768

Wigboldus, S., Klerkx, L., Leeuwis, C., Schut, M., Muilerman, S., & Jochemsen, H. (2016). Systemic perspectives on scaling agricultural innovations: A review. *Agronomy for Sustainable Development*, *36*(3), Article 46, 1-20. https://doi.org/10.1007/s13593-016-0380-z

Williams, B. (2003). The worldview dimensions of individualism and collectivism: Implications for counseling. *Journal of Counseling & Development*, *81*(3), 370-374. https://doi.org/10.1002/j.1556-6678.2003.tb00263.x

Yami, M., van Asten, P., Hauser, M., Schut, M., & Pali, P. (2019). Participation without negotiating: Influence of stakeholder power imbalances and engagement models on agricultural policy development in Uganda. *Rural Sociology*, *84*(2), 390-415. https://doi.org/10.1111/ruso.12229

Ziervogel, G., Enqvist, J., Metelerkamp, L., & van Breda, J. (2022). Supporting transformative climate adaptation: Community-level capacity building and knowledge co-creation in South Africa. *Climate Policy*, *22*(5), 607-622. https://doi.org/10.1080/14693062.2020.1863180