

**Improving Beneficiary-Centered, Participatory Development Projects through
Reciprocal Information Sharing and Mental Model Building**

by

Rebecca Dalton Spellissy

A project submitted
in partial fulfillment of the requirements
for the degree of
Master of Science (Natural Resources and Environment)
at the University of Michigan
December 2016

Faculty Advisors:

Assistant Professor of Practice, Jose Alfaro, Chair
Lecturer and Research Area Specialist, Avik Basu

Abstract

Small-scale, community development projects have incorporated participatory approaches to improve their long-term success; however, these projects are not as participatory nor as successful as expected. Published reviews and project reports demonstrate many of these projects are participatory in name only. They include the rhetoric of participation and empowerment, but do not address the underlying attitudes or “us versus them” nature that often occur in development projects. Intentionally or unintentionally, these attitudes lead to asymmetric flows of information, which result in limited beneficiary involvement in the project, especially in major decisions related to the project or choice of technology. The absence of reciprocal information sharing limits participation, conveys disrespect, and prevents beneficiaries from developing a sense of ownership and gaining deeper understanding of the project. These statements are substantiated by the concepts of reciprocal information sharing and mental model building from the Reasonable Person Model, a cognitive framework based on human informational needs. This paper discusses the consequences of asymmetric information sharing and the need for reciprocal information sharing in beneficiary-centered, community development projects and presents a set of guidelines to avoid frequent difficulties in these projects. The proposed guidelines are supported through extensive literature review, project evaluations, and observations from field work.

Acknowledgements

This Master's thesis was inspired and supported by several advisors, colleagues, and mentors. I am grateful to my thesis advisors at University of Michigan, Dr. Jose Alfaro and Dr. Avik Basu, for their support and guidance. They were instrumental in this research, permitted me to explore topics based on my own curiosity, and granted me many opportunities to further this research and my academic studies. I would like to acknowledge my fellowship with reDirect, a nonprofit organization, and to thank reDirect's board for their support. Through this fellowship, I began applying approaches based on the Reasonable Person Model to international development organizations, which evolved into this Master's thesis. I would also like to thank Sustainability without Borders and the Peru team for granting me the opportunity to apply this research to the Peru Project.

I would like to acknowledge Johns Hopkins University's Chapter of Engineers without Borders, the initial curiosity that led to research supporting this paper originated from the South Africa Project of Johns Hopkins University's Chapter of Engineers without Borders. I would like to thank Dr. Bill Ball, Ms. Diana Herriman, other faculty advisors and professional partners, and the project's local partners who guided and supported this project for ten years.

I am very grateful for my family and friends; they provided much needed support and unconditional love as I completed this Master's thesis. This thesis, much like my other achievements, would not have been possible without you.

This paper is dedicated to the everlasting memory of David Alcock, the South Africa Project's primary partner, who ignited my passion for community development projects and taught me countless lessons. David, you always will be a source of inspiration, motivation, and encouragement to me. As his extraordinary wife, Carole Baekey, described, David is a person of the utmost integrity and honor and "David is the real deal" – David, you really were.

Table of Contents

I.	Introduction	1
II.	Literature Review	3
A.	Overview of Approaches in Development Projects: From “Top-down” to “Bottom-Up”	3
B.	Findings and Implications: Asymmetrical Information Sharing	6
III.	The Reasonable Person Model	7
A.	Reciprocal Information Sharing	7
B.	Building Mental Models	9
C.	Examples of These Concepts in Community Development Projects	10
IV.	Reciprocal Information Sharing Concepts in Current Participatory Development Projects	13
V.	Proposed Reciprocal Information Sharing Approaches in Development Projects	19
VI.	Discussion and Conclusions	21
VII.	Appendix	23
VIII.	References	27

I. Introduction

Participatory, beneficiary-centered, community development projects are the latest in the evolution of development projects to include the rhetoric of participation and empowerment; however, many projects have been unable to substantially improve community participation or change attitudes, power relations, or “us versus them” nature present in development work (Chambers, 1994; Cornwall & Pratt, 2011; Mansuri & Rao, 2004, 2011). Projects using participatory approaches originated in a movement during the 1980s to change the design of international development projects from their traditional “top-down” approaches, which were seen as “deeply disconnected from the needs of the poor, the marginalized, and the excluded” (Hans P. Binswanger-Mkhize, de Regt, & Spector, 2010; Mansuri & Rao, 2013). Scholars believed these new participatory, beneficiary-centered, “bottom-up” projects would better serve project recipients by giving them a greater say in decisions and would be “more sustainable than those implemented with little or no participation” (Kleemeier, 2000; Mansuri & Rao, 2013). Despite the goals of participation in beneficiary-centered, community development projects, many project reviews demonstrate that projects were conducted based on predetermined goals and solutions, with outside agendas that overpowered local knowledge and needs, and with limited decision-making power of the communities (Mansuri & Rao, 2004; Mosse, 2001; Pozzoni & Kumar, 2005).

Some development scholars believe these new projects are participatory in name only because several organizations view community participation similar to Arnstein’s description, as “manipulation and as a feel-good exercise that goes no further” (Arnstein, 1969; Hans P. Binswanger-Mkhize et al., 2010; Cornwall & Pratt, 2011). Cornwall and Pratt have gone as far as saying that some organizations use participatory approaches to “reinsert existing relations of power/knowledge without any semblance of challenge or change” (Cornwall & Pratt, 2011). Binswanger-Mkhize, et al. discussed these “relations of power/knowledge” that often occur in interactions with community members because outside organizations, field agents, researchers, and experts often lack respect and humility in these interactions (Hans P. Binswanger-Mkhize et al., 2010). Binswanger-Mkhize, et al. state that this leads to a misperception of rural poverty and its root causes because the outside organizations, field agents, researchers, and experts are unable to see the causes or appreciate “the richness and validity of rural people’s knowledge or the

hidden nature of rural poverty” (Hans P. Binswanger-Mkhize et al., 2010). These disrespectful, “us versus them” attitudes reinforce the practice of sharing information in “top-down”, asymmetrical flows from the outside organizations to the projects’ beneficiaries (Cornwall & Pratt, 2011; Mansuri & Rao, 2004).

These asymmetrical flows of information can occur if organizations limit opportunities for the community to participate or make decisions about the project (Mansuri & Rao, 2012, 2013). Additionally, by disseminating information to a community about a predetermined project, this can result in the organizations preventing the incorporation of local knowledge and reducing the community’s investment in the project (Mansuri & Rao, 2012, 2013). To incorporate local knowledge and increase beneficiary participation, involvement in decisions, and investment in the project, development projects should share information through reciprocal flows that are respectful, mutual exchanges of information and ideas. Reciprocal information sharing can be fostered by several approaches, including understanding someone’s mental models and engaging in mental model building with them. Mental models are used to store vast amounts of information, recall information rapidly when needed, and recognize familiar situations or emotions; these models are built through understanding, exploring, and applying new information (Basu & Kaplan, 2015a). Personal experiences shape mental models, which result in unique mental models based on individual perspectives (Ann R. Kearney, 2015). By understanding the perspectives, knowledge, needs, and values of the project’s beneficiaries, several issues that frequently arise in beneficiary-centered, participatory development projects can be prevented (Ann R. Kearney, 2015).

This paper illustrates that beneficiary-centered, participatory development projects continue to share information through “top-down”, asymmetrical flows which limit beneficiary involvement in the project and an outside organization’s understanding of beneficiaries’ mental models. Limiting beneficiary involvement and understanding of beneficiaries’ mental models, often creates projects that are not as participatory or successful as expected (a successful project in this paper is defined by “the capacity of a project to continue to deliver its intended benefits over a long period” (Bamberger & Cheema, 1990)). These concepts of reciprocal information sharing and mental model building have been demonstrated in other fields by the Reasonable Person Model, a cognitive framework based on human informational needs. This paper proposes guidelines that are an alternative approach to beneficiary-centered, participatory development

projects and are designed to facilitate reciprocal information sharing and engaging in mental model building. The proposed guidelines are also supported through literature review, project evaluations, and observations from field work.

II. Literature Review

A. Overview of Approaches in Development Projects: From “Top-down” to “Bottom-Up”

After the end of World War II, centralization was prevalent around the globe, including aid organizations that supported top-down, centralized authorities as “the best way to introduce new technologies and modernize societies” (Hans P. Binswanger-Mkhize et al., 2010). These technologies were intended to assist developing countries and were part of a transfer of technology, which was considered the movement of “capital goods, product designs and operational know-how” between countries (Lema & Lema, 2013). A widely used approach in international farming research and development projects was the central source model, which stated the transfer of technology occurred through international research institutions discovering technical innovations, and then passing these down to national institutions, extension agencies, and finally to the project’s beneficiaries (Biggs, 1990). Many of these projects failed because the beneficiaries did not adopt the new technologies, often because local knowledge was not incorporated into the project due to research intuitions viewing local knowledge as inferior (Biggs, 1990; Hans P. Binswanger-Mkhize et al., 2010). Learning from these failures, research institutions tried a different approach, the multiple source model, where innovations came from diverse sources, such as beneficiaries, extension staff, nongovernmental organizations, and national research systems, in addition to research institutions (Biggs, 1990). However, in many of these projects, participation of the project’s intended population was limited or nonexistent, hindering their success.

To improve these projects, the approach to agricultural and rural development projects was changed to target special areas or projects; in the 1970s, these projects were central to the World Bank’s Area Development Programs (ADPs) (Hans P. Binswanger-Mkhize et al., 2010). ADP’s were targeted to specifically “integrate many strands of development, from irrigation and agricultural credit to rural infrastructure, education, health, water supply, and small-scale industry” (Hans P. Binswanger-Mkhize et al., 2010). These projects were supposed to abide by

the World Bank's Rural Development Policy of 1975 that stated the need to incorporate participation in these projects; however, most ADPs ignored this policy because it "would have required major, time-consuming institutional change" and instead, "many projects were prepared in a hurry by agricultural professionals with little beneficiary involvement" (H. P. Binswanger-Mkhize, de Regt, & Spector, 2010). ADPs limited community involvement and were carried out based on the organization's priorities, and thus these projects also "fared poorly", with a success rate of less than half (Hans P. Binswanger-Mkhize et al., 2010). With these evaluations, there was pressure for the World Bank to include participatory approaches from other organizations and institutions, such as rapid rural appraisals (RRAs) and participatory rural appraisals (PRAs) (Hans P. Binswanger-Mkhize et al., 2010).

Rapid rural appraisals were utilized by many organizations in the 1970s and 1980s because they provided "a streamlined, effective method and toolset to provide a quick, high-quality understanding of community development realities without the expensive, time-consuming surveys" (Hans P. Binswanger-Mkhize et al., 2010). RRAs applied "bottom-up" approaches to small-scale development projects with the "external agents acting mainly as facilitators and sources of funds" (Mansuri & Rao, 2004). This style of approach was believed to yield more effective projects because it reversed the traditional "top-down" structure of development projects (Hans P. Binswanger-Mkhize et al., 2010; Chambers, 1983). By the late 1980s, rapid rural appraisal programs evolved into participatory rural appraisals, with the popularity and support for these methods coming from Robert Chambers' seminal book, *Rural Development: Putting the Last First* (Chambers, 1983; Mansuri & Rao, 2004). The main difference between RRA and PRA is the importance placed on beneficiary participation in PRAs (Hans P. Binswanger-Mkhize et al., 2010). RRA and PRA approaches grew from international farming research practices and these approaches were characterized by an outside facilitator using "diagrams, maps, or quantification that are created and presented by rural people in a manner they readily understand", "walks across the village to gain a shared understanding of the environment", and other techniques to assist the community in presenting information to the outsider (Hans P. Binswanger-Mkhize et al., 2010). Many aid agencies, NGOs, and research institutes integrated PRAs into participatory development projects, marking a transition from "top-down" to "bottom-up" approaches that focused on the project's beneficiaries (Hans P. Binswanger-Mkhize et al., 2010).

This transition was widely supported because many development critics, such as Escobar and Scott, “argued that top-down perspectives were both disempowering and ineffective” (Mansuri & Rao, 2004). However, Chambers voiced concerns about the rapid uptake of PRA methods; these concerns came to fruition and PRA became discredited “by overrapid promotion and adoption, followed by misuse, and by sticking on labels without substance” (Chambers, 1994; Cornwall & Pratt, 2011). In this rapid expansion, many organizations used PRA approaches to legitimize their projects’ unconvincing attempts to incorporate participation or to legitimize their projects’ previously established priorities (Chambers, 1994; Cornwall & Pratt, 2011; Mansuri & Rao, 2004, 2011). Many organizations viewed PRA as containing “the magic ingredient” to incorporate beneficiary participation into the project and its methods as “simple and easy, quick fixes” for the previous issues in development projects (Chambers, 1994; Cornwall & Pratt, 2011). This use of PRA resulted in projects characterized by “hurried rural visits, insensitivity to social context” and by projects’ beneficiaries being “neither seen, listened to, nor learnt from” (Chambers, 1994).

These misuses of PRA forced organizations to reconsider and expand their participatory approaches, influencing the World Bank’s Community Based Development (CBD) programs of the 1990s and similar programs from other organizations (Hans P. Binswanger-Mkhize et al., 2010; Cornwall & Pratt, 2011). Community Based Development projects use a community consultation approach to “actively include beneficiaries in their design and management” (Hans P. Binswanger-Mkhize et al., 2010; Mansuri & Rao, 2004). This style of project aims for consultation as opposed to community participation or empowerment; these CBD projects later included the language of empowerment (Hans P. Binswanger-Mkhize et al., 2010). In the 2000s, the World Bank introduced Community Driven Development (CDD) projects, which are CBD projects in which the community has control over both the project and its resources (Hans P. Binswanger-Mkhize et al., 2010; Mansuri & Rao, 2004). Community Driven Development projects attempt for greater community involvement in the project and, in theory, should be more effective at incorporating local knowledge into the project, building social capital, and empowering the projects’ beneficiaries (Mansuri & Rao, 2004). However, evaluations of CBD, CDD, and similar projects reveal that the projects fulfilled quantitative goals, completing a designated number of training sessions, but not the associated qualitative goals, i.e. training sessions that enhanced capacity and understanding (Hans P. Binswanger-Mkhize et al., 2010;

Pozzoni & Kumar, 2005). Evaluations also reveal that some projects failed to empower the local community because community involvement was limited in project design and was nonexistent during project identification and implementation (Hans P. Binswanger-Mkhize et al., 2010; Pozzoni & Kumar, 2005).

B. Findings and Implications: Asymmetrical Information Sharing

Current beneficiary-centered, participatory development projects can be characterized by a description of PRA from 1997 that was published in 2002, the organizations incorporated participation by adopting “the new rhetoric of participation; [but] few change what they do” (Chambers, 2002; Cornwall & Pratt, 2011). As the previous overview demonstrated, beneficiary-centered, participatory projects continue to be carried out based on predetermined solutions, outside agendas that overpower local knowledge, and limited beneficiary involvement in decision-making. The projects use participatory activities as a forum to inform the beneficiaries of project details that have been previously decided or of their expected contributions to the project (Mansuri & Rao, 2004, 2011). The interactions between the outside organization and the project’s beneficiaries remain “top-down” in approach because they are characterized by one-directional, asymmetrical flows of information from the organization to the beneficiaries.

Asymmetrical flows of information limit the beneficiaries’ involvement in the project, the incorporation of local knowledge into the project, and the beneficiaries’ understanding of the project. Several of the recurring issues of participatory approaches are rooted in this asymmetrical flow of information that reinforces the lack of understanding the perspectives, knowledge, needs, values, and behaviors of the project’s beneficiaries (Ann R. Kearney, 2015). Fostering reciprocal information sharing is an approach that can assist outside organizations in preventing these issues, by understanding the beneficiaries’ mental models, and engaging in mental model building with the beneficiaries.

III. The Reasonable Person Model

A. Reciprocal Information Sharing

As discussed in the previous section, beneficiary-centered, participatory development projects disseminate information to the beneficiaries in asymmetric, one-direction flows, instead of sharing information reciprocally. True sharing of information is inherently reciprocal;

characterized by two-directional flows where there are mutual exchanges of information and ideas. This style of information sharing can be fostered by conveying respect, listening to the beneficiaries, utilizing participatory approaches early in the project, incorporating the beneficiaries' feedback into the project, and trying to understand the beneficiaries' mental models.

Conveying respect fosters reciprocal information sharing because it demonstrates to the beneficiaries that their perspectives are valued, which encourages the beneficiaries to share their knowledge (Basu & Kaplan, 2015b). Also, showing respect for someone can build trust, result in earning respect, and increase someone's willingness to participate (Basu & Kaplan, 2015b). Respect can be conveyed by listening to people, which also fosters reciprocal information sharing because it helps "gauge how much information to convey and in what form it is useful to the recipient" and helps understand the recipient's mental models (Basu & Kaplan, 2015a). Listening also facilitates a collaborative approach because new insights or solutions can be discovered and considered (Basu & Kaplan, 2015a). People value participation because it offers a platform for being listened to and of having their opinions heard (Ann R. Kearney, 2015).

Most people want to contribute or participate in a meaningful way, this is often seen in the human desire to be connected to others or be part of a larger purpose (Basu & Kaplan, 2015a). People may want to participate; however, this desire can erode if they become frustrated, despondent, or resentful because they believe their input was ignored or did not make a difference (Basu & Kaplan, 2015b). To encourage continued participation and foster reciprocal information sharing, participatory approaches should begin as early as possible and involve as many beneficiaries as possible (Basu & Kaplan, 2015b). By starting these approaches early, beneficiaries' ideas can be easily incorporated into the project, encouraging continued participation because these gestures reassure beneficiaries that they can meaningfully contribute to the project, regardless of their level or area of expertise (Ann R. Kearney, 2015). Incorporating their ideas into the project also conveys respect to the people who took the time to offer their feedback and signifies the impact of their voice, knowledge, and perspective, which can promote a sense of ownership of the project (Ann R. Kearney, 2015). Participation is also a way that people can share their mental models for others to understand; through this understanding, an outside organization can facilitate reciprocal information sharing and improve the beneficiaries' understanding of a project (Ann R. Kearney, 2015).

Understanding someone's mental models fosters reciprocal information sharing because these models reflect personal experiences and perspectives, which can influence someone's interpretation of the world and if "new information will be processed and integrated with existing knowledge or disregarded as irrelevant" (Ann R. Kearney, 2015). By actively listening, a mental model of what is being discussed can be built; this mental model helps understand participants' mental models and perspectives (Basu & Kaplan, 2015a). Peoples' perspectives can cause them to "ignore or discount the perspectives of others" and limit their ability to see from the others' perspective (Ann R. Kearney, 2015). Understanding someone's mental models can facilitate effective communication that is collaborative and participatory, especially when there are differences in mental models between the person providing information and the person receiving information (R. Kaplan, 2015; Ann R. Kearney, 2015).

Someone who has expertise with the information they are sharing often has well-developed mental models created from their vast experience and deep understanding of the information being shared; this can make it difficult to communicate effectively with someone who does not share this knowledge or similar mental models (R. Kaplan, 2015; S. Kaplan, 2015). An expert's familiarity with specific topics leads to highly compact mental models, with multiple elements grouped into singular units (R. Kaplan, 2015; S. Kaplan, 2015). The more compact mental models become, the more ingrained the information becomes, creating situations where something is so obvious to an individual that they forget the need to communicate it to others (Ann R. Kearney, 2015). Experts often share information based on their own familiarity with the subject, leading them to use overly complex and technical terms, and forgetting the difficulties they experienced when first learning this information (R. Kaplan, 2015; S. Kaplan, 2015). Frequently, this results in the project's beneficiaries not understanding the information that was shared, unless their mental models are similar to those of the expert. An expert's deep understanding and experience also allows them to easily identify a solution to a problem; however, the solution is biased by their perspective, which can be narrow because it often ignores most of what is going on outside of the expert's own mind (R. Kaplan, 2015; S. Kaplan, 2015). This perspective can hinder problem solving efforts because the experts may choose their ideal solution instead of assisting the project's beneficiaries in expanding their knowledge and allowing for collaborative problem solving (Basu & Kaplan, 2015a). By looking beyond their own perspective and understanding the mental models of the project's beneficiaries,

an expert can share information in a way to facilitate mental model building (Ann R. Kearney, 2015).

B. Building Mental Models

Mental models are built through understanding new information and then experiencing, applying, and exploring this information (R. Kaplan, 2015). By understanding the mental models of the participants, the facilitator can foster mental model building through sharing new information in a way that avoids confusion, which is detrimental when building mental models, and in a way that connects to existing knowledge (Basu & Kaplan, 2015b; R. Kaplan, 2015). This allows recipients to associate new information to previous knowledge and build new mental models based on existing models, which increases the likelihood that new information will be understood (Basu & Kaplan, 2015b; R. Kaplan, 2015). In addition to making associations, the facilitator should avoid providing too much new information; this can be counterproductive because it can prevent the recipients from understanding the information, and therefore building their own mental models (Basu & Kaplan, 2015b; R. Kaplan, 2015). Understanding new information is increased when the recipients repeatedly experience and apply this information. Repeated experiences are essential to create mental models because through the experiences, familiarity with the information is gained, leading to more intimate knowledge of the information, which fosters a sense of ownership (Pierce & Jussila, 2010). If previous experiences contradict new information, it can become difficult for recipients to internalize the conflicting information; the facilitator should encourage engaged, self-directed exploration to assist with revising existing mental models and gaining intimate knowledge of the information (Basu & Kaplan, 2015b; R. Kaplan, 2015). Facilitating mental model building can improve a person's understanding of new information and foster a sense of ownership; both can impact the success of a beneficiary-centered, participatory development project.

C. Examples of These Concepts in Community Development Projects

The importance of reciprocal information sharing, understanding a beneficiary's mental models, and facilitating mental model building was seen in an Engineers without Borders – USA, community development project in South Africa. From May 2006 to August 2009, this project installed ram pumps at four different gardening communities: Inchanga, Maphaphateni, Esimozomweni, and Mary Grey, and at one agricultural college, Zakhe, where it was intended to

be an educational tool for the students. These five sites were monitored and assessed from 2009 to 2014 and determined sustainable for project close-out by Engineers without Borders – USA in November 2014. All four gardening community sites had similar socio-economic status, culture, religion, and geographic location. In addition, the approaches for community participation, the stages of the project, training sessions and their instructional materials were also identical for each site. Despite these commonalities, three of the gardening community sites struggled while one site, Mary Grey, thrived; this was because of Philemon Blose, the individual responsible for maintaining the pump at Mary Grey.

On all visits to Mary Grey, the ram pump would be functioning and perfectly maintained. During these visits, Blose would inform Engineers without Borders – USA of the experiments he performed to test his different hypotheses for improving the ram pump's efficiency. A ram pump functions by moving up and down, this is called the stroke length which is controlled by a metal rod inside of the pump; Blose experimented with different lengths of this metal rod to see if by changing the stroke length he could change the output of the pump. Blose also tested different rubber thicknesses to see if this would change pump's output; the rubber piece is used to create a seal between the water returning the stream and the water that is pumped to the storage tank. Through his experiments, Blose explored various ways he thought he could improve the ram pump's efficiency. Blose had previously been a mechanic, which allowed him to engage in this self-directed exploration because he had existing mental models and easily associated those to new information about the ram pumps. Blose understood this new information because of his previous experience and was able to explore different hypotheses for improving the ram pump; this resulted in a greater understanding of the ram pump, engaging in mental model building activities, a sense of ownership, and the most successful project site.

This self-directed exploration formed new mental models, expanded existing mental models, and resulted in Blose's deep knowledge of the information shared by Engineers without Borders – USA. At the other community gardens, Engineers without Borders – USA was unsuccessful at fostering reciprocal information sharing or mental model building, primarily because they shared information to the garden community members from Engineers without Borders – USA's perspective and had little understanding of community gardeners' mental models. This was most evident in Engineers without Borders – USA's maintenance manual, which was overly complex and lengthy, even for their own members and Blose, who once

informed a member that he had never opened the manual. Reciprocal information sharing, understanding a beneficiary's mental models, and building mental models impacted the overall success of this project. Two years after the conclusion of Engineers without Borders – USA's involvement with this project, Mary Grey is the only site that is considered a success; this site is still functioning and thriving, while the pumps at all remaining sites are broken or abandoned.

Another example of reciprocal information sharing and mental model building in a community development project is a Sustainability without Borders' project that utilized these concepts when designing and facilitating training sessions for an aquaponics system in Peru. Sustainability without Borders is an interdisciplinary student organization at the University of Michigan that engages in community development projects with the intentions of mutually building capacity and sharing knowledge. In May 2015, this project installed four aquaponics systems at different households in a community in Peru. The training sessions that accompanied these installations used an approach that was designed to facilitate mental model building by recalling the initial mental models formed when learning about the system, expanding this understanding through the introduction of more components of the system, and, when possible, making associations to existing knowledge.

The training sessions fostered reciprocal information sharing and mental model building by listening to the beneficiaries to learn their existing mental models and recalling the initial information that was necessary to build the more complex mental models. Listening to the participants facilitated information sharing because it assisted in understanding and recognizing the existing mental models of the beneficiaries; this ensured valuable information was shared with the participants. It can be challenging to find the balance between providing necessary information without creating confusion or sharing information that is known, and potentially patronizing the person. This challenge occurred in the training sessions and manuals for the aquaponics systems because they included only a few sentences on methods for planting, because the outside organization that created these materials believed this information would be unnecessary. The beneficiaries of the aquaponics system have vastly more farming experience, so the outside organization was concerned that including this information would be perceived as condescending. However, the beneficiaries asked repeatedly for information about plant selection and planting methods because they were unfamiliar with planting in the aquaponics system. The beneficiaries' existing farming mental models needed to be associated to the aquaponics system

and the outside organization needed to provide additional information to assist with this association. While this method of sharing information can be iterative, therefore slightly more time consuming, it was arguably more favorable than the alternative, the outside organization patronizing the beneficiaries by informing them about their own area of expertise.

The training sessions also fostered mental model building by recalling the first steps of learning, researching, and understanding aquaponics systems and then using these initial mental models. These initial models became the foundation for more complex and condensed models; utilizing the initial models to share information facilitates mental model building because these mental models may reflect those of the beneficiaries or someone learning about this technology for the first time. Furthermore, deconstructing complex mental models assists in identifying concepts that could be more difficult for the beneficiaries to grasp and understand. For example, many of the aquaponics systems' beneficiaries did not have a high school degree and the training sessions included slightly complex topics, such as dissolved oxygen. Because this concept could be difficult for someone who has not completed high school or middle school, dissolved oxygen was introduced to participants through associating how humans need to breathe with fish needing to breathe as well. After this association, the training session then discussed visual signs for low levels of dissolved oxygen, how to test the level of dissolved oxygen, and how to resolve issues with low levels of dissolved oxygen. This style of approach was utilized for participants who were not familiar with this concept of dissolved oxygen to prevent the possibility of offending participants who were familiar with this concept.

These examples of reciprocal information sharing, understanding a beneficiary's mental models in community development projects are significant because they demonstrate the potential impact of these concepts. Much like the Engineers without Borders – USA project, other beneficiary-centered, participatory development projects have outside organizations or information providers that are often biased by their own perspectives and experiences. This can result in sharing information from their viewpoint instead of the community's, or believing their solutions and explanations are the only ones. This bias prevents reciprocal information sharing because it lacks respect, discourages participation, does not provide pathways for feedback, lacks understanding participants' mental models, and does not facilitate mental model building. These examples also demonstrate techniques for fostering reciprocal information sharing and mental model building, which have been adapted into proposed guidelines located in Table 2 of this

paper. These impacts and techniques can be further illuminated in published project reviews that demonstrate the low success rates of beneficiary-centered, participatory development projects occur, in part, because of the lack of reciprocal information sharing and mental model building.

IV. Reciprocal Information Sharing Concepts in Current Participatory Development Projects

Four published reviews of beneficiary-centered, participatory development projects were analyzed to further demonstrate the theory that low success rates of these projects resulted from a lack of reciprocal information sharing and no efforts to facilitate mental model building. In this comparison of the four reviews, three reciprocal information sharing components were analyzed: interactions with project beneficiaries, beneficiary involvement, and efforts to understand and build mental models. Overall outcomes of the project were analyzed in terms of the project's success, to demonstrate the effect of reciprocal information sharing on project success.

The first component of reciprocal information sharing that was analyzed was the interactions between the organization and the project's beneficiaries. To foster reciprocal information sharing, these interactions needed to convey respect and be characterized by mutual exchanges of ideas and knowledge. Collaborative interactions were considered interactions in which the outside organization conveyed respect for the beneficiaries' perspective, beliefs, culture, and knowledge and listened to the beneficiaries, which yielded collaborative efforts to include new insights or solutions into the project. Interactions where the organization lacked respect and disregarded local knowledge or needs were not considered collaborative. Interactions that were characterized by the organization discussing predetermined solutions or ideas were also not considered collaborative because these projects excluded the input of the beneficiaries.

The second component analyzed was the beneficiary involvement in the project. Reciprocal information sharing is fostered by participatory approaches that begin early and involve a wide array of beneficiaries. Involvement of the beneficiaries was characterized by early participatory approaches, incorporation of the beneficiaries' feedback into project, the beneficiaries undertaking project initiatives and controlling the project, and all project beneficiaries, not just the leadership in the community. In this analysis, contribution of labor or money to the project or decisions made about predetermined project details were not considered

beneficiary involvement because several studies have shown that the relationship between these contributions and project success is weak and inconsistent (Isham & Kahkonen, 2002; Mansuri & Rao, 2013; Marks & Davis, 2012; Prokopy, 2005).

The third component of reciprocal information sharing analyzed was the effort made to understand the beneficiaries' mental models and to facilitate mental model building. If an organization has some understanding of the beneficiaries' mental models, then it can share information in a way that connects to the beneficiaries' existing knowledge, improving the likelihood that the shared information will be understood. Efforts to facilitate mental model building can be seen through the organization encouraging engaged problem solving, self-directed exploration, or structuring training sessions to include multiple and varied experiences with the information. By understanding the beneficiaries' mental models and facilitating mental model building, the project would be collaborative in design, more likely to address the beneficiaries' needs, be understood by the beneficiaries, and be maintained by the beneficiaries

Consistent with earlier sections of this paper, success of a project was defined in this analysis as "the capacity of a project to continue to deliver its intended benefits over a long period" (Bamberger & Cheema, 1990). A project that had a low success rate was one in which most project sites were unable to deliver the project's intended benefits after the organization ended its involvement. A medium success rate was considered a project where roughly half the sites delivered the intended benefits after the organization ended involvement. And a high success rate was a project where most of sites delivered the intended benefits after the organization ended its involvement.

The first review analyzed was a selection of Malawi's rural piped water program that included 17 projects with a total of 888 taps (Kleemeier, 2000). Eleven of these programs were completed in 1974 and six projects were completed in 1997 (Kleemeier, 2000). The later six projects "incorporated even more extensive community participation, and these elements grew over the life of the projects", compared to the other eleven projects analyzed in this review (Kleemeier, 2000). However, from this review, all 17 projects were lacking in terms of collaborative interactions with the project's beneficiaries. These 17 projects have a relatively low success rate due to "washed out pipes over river and gully crossings, vandalism, and pipe breaks and blockages" from poor preventative maintenance of the systems (Kleemeier, 2000).

The second review analyzed World Bank assisted rural water and sanitation projects in India, one project was in the Karnataka province and the other project was in Uttar Pradesh (Prokopy, 2005). This review examined twenty-five villages of the 1,200 in the Karnataka province project and twenty villages of the 1,000 in the Uttar Pradesh province project (Prokopy, 2005). In the Karnataka project, the villages had no input on the type of project or technology selected; these were instead selected based on the size of the village (Prokopy, 2005). The villages in the Uttar Pradesh project were given a choice of the project's technology; the involvement of these villages also improved over the project's lifetime (Prokopy, 2005). In the Uttar Pradesh project, more households were aware of the project prior to construction, present at meetings before and after construction, had greater satisfaction with the project, and had equal access to water (Prokopy, 2005). The project outcomes measured in this review "are only indicators of future sustainability" because at the time of the review, the projects had been operating for an average of one year (Prokopy, 2005).

The third review analyzed community rural water supply projects in three provinces in Kenya, for 50 community water projects, a total of 1,140 household were interviewed to examine the relationship between participation and sense of ownership (Marks & Davis, 2012). Roughly 29% of all households analyzed had a private tap in their yard, this is considered the highest level of service and is "often not provided through developing country rural water supply investments"; the lower levels of service are considered shared sources, kiosks, or taps (Marks & Davis, 2012). Private taps were found to be "significantly associated with enhanced sense of ownership among sample households" (Marks & Davis, 2012). However, beneficiary involvement and collaboration was low, with 26% of households attending meetings before the water system was constructed and 27% involved in decisions about the level of service (Marks & Davis, 2012). This study did not analyze the outcomes of the projects in terms of project success (Marks & Davis, 2012).

The fourth review analyzed community-based water projects in Central Java, Indonesia through surveys, technical assessments, and participatory approaches (Isham & Kähkönen, 1999). This paper's analysis focuses on two organizations' projects examined in the review. The first organization's projects analyzed were those completed by NGOs and included 200 households from eight villages (Isham & Kähkönen, 1999). The second organization's project analyzed were part of the Water Supply and Sanitation Project for Low Income Communities

(WSSLIC) and included 475 households from 19 villages (Isham & Kähkönen, 1999). The NGO projects were designed jointly by the villagers and NGO representatives; this was very different from the WSSLIC projects, where “villagers were supposed to express their preferences through village water committees that were established at the start of the project”; however, the outside organization determined the final project design (Isham & Kähkönen, 1999). This review found that selection of different technologies resulted from households participating and making informed decisions (Isham & Kähkönen, 1999). The NGOs projects incorporated multiple training sessions, including health education; this is significant because 62% of projects’ households reported improved health and 36% reported a decreased incidence in diarrhea (Isham & Kähkönen, 1999). Additionally, 48% of the WSSLIC projects’ households reported that they have water every day and only 49% reported they are able use this service to meet all their daily water needs; for NGO projects, these values were 84% and 92% (Isham & Kähkönen, 1999).

Table 1: Summary Table of Reciprocal Information Sharing in Selected Existing Participatory Development Projects

Project	Interactions	Beneficiary Involvement	Efforts to Understand and Build Mental Models	Project Success
Piped Water Program Malawi				
11 Programs	Not collaborative	No involvement	No demonstrated efforts	Low
6 Programs	Not collaborative	Involvement, improved over time	No demonstrated efforts	Low
Rural Water and Sanitation India				
Karnataka	Not collaborative	No involvement	No demonstrated efforts	Low*
Uttar Pradesh	Collaborative, over time	Involvement, improved over time	No demonstrated efforts	Low-Medium*
Rural Water Supply Kenya				
50 Community Projects	Not collaborative	Limited involvement	No demonstrated efforts	Not Specified
Water Project Indonesia				
NGOs Projects	Collaborative	Involvement, not full control	Several efforts	Medium-High
WSSLIC Projects	Not collaborative	No involvement	No demonstrated efforts	Low

* Concluded based on the outcomes of the project, which “are only indicators of future sustainability” (Prokopy, 2005).

As summarized in Table 1, the community-based water projects performed in Central Java, Indonesia by NGOs were the most successful and the only projects to collaborate with beneficiaries, utilize participatory approaches that started early and involved many, incorporate feedback into the project, and make efforts to understand and build mental models (Isham & Kähkönen, 1999). These community-based water projects were collaborative in design because the services built were a joint design by the village and staff of the NGOs (Isham & Kähkönen, 1999). Additionally, the project's beneficiaries and the NGOs made the final decision about the design of the service in partnership (Isham & Kähkönen, 1999). Both NGOs were equipped for these collaborative approaches to community-based water projects (Isham & Kähkönen, 1999). This was evident in the multiple training and informational sessions the NGOs incorporated into the project; the villagers were provided with hygiene education, administration training, financial management training, and training for operation and management of the service (Isham & Kähkönen, 1999).

The Uttar Pradesh project had the second highest success rate, however, this success rate is based on project indicators of sustainability (Prokopy, 2005). Beneficiary involvement in this project improved over time and the beneficiaries made decisions concerning the type of technology used in the project (Prokopy, 2005). This success rate is projected to be low-medium because there were no training sessions mentioned in this review but the review found that the more a household “participated in decisions about the water project, the better the project outcomes” because the project will be a collaborative design that better addresses each village's unique needs (Prokopy, 2005). Additionally, there were no demonstrated efforts to understand and build mental models in this project review.

The other projects had low success rates and were characterized by non-collaborative efforts, no beneficiary involvement, and no demonstrated efforts to understand and build mental models. These findings are consistent with the previous example of the Engineers without Borders – USA project in South Africa, where the only successful project site was the site where interactions were mutual exchanges of ideas and knowledge and where Engineers without Borders – USA's shared information with Blose in a way that he understood, leading to self-directed exploration and expanding existing mental models.

V. Proposed Reciprocal Information Sharing Approaches in Development Projects

The proposed guidelines for reciprocal information sharing and building mental models were supported through literature review and analysis of case studies, inspired by the experiences with Blose in South Africa, and adapted from training sessions for aquaponics systems in the community development project in Peru. The proposed guidelines, expected impacts, and suggested approaches that use the guidelines are listed in Table 2. Many of the proposed guidelines were mentioned in this paper as methods to foster reciprocal information sharing and facilitate mental model building, several are also adapted from the Reasonable Person Model. The expected impacts of the proposed guideline were mentioned throughout this paper as the effect that reciprocal information sharing and understanding and building mental models can have on the beneficiaries' understanding, and potentially a project' success. The suggested approaches that use the guidelines are examples of how an organization could use these guidelines to foster reciprocal information sharing and facilitate mental model building in a beneficiary-centered, participatory development project.

Table 2: Proposed Guidelines, Expected Impacts, and Approaches Using Guidelines

Proposed Guidelines for Reciprocal Information Sharing		
<u>Guidelines</u>	<u>Expected Impacts</u>	<u>Approaches Using Guidelines</u>
Convey Respect	<ul style="list-style-type: none"> • Builds trust • Earns respect • Encourages participation 	<ul style="list-style-type: none"> • Suggestions for fostering reciprocal information sharing can found in Section III. A of this paper. • The Conceptual Content Cognitive Map (3CM) tool can engage participants, assist with externalizing mental models, and be used when sharing differing perspectives.[†]
Listening	<ul style="list-style-type: none"> • Project includes local knowledge • Effective communication • Conveys respect • Assists in understanding mental models 	
Early Involvement	<ul style="list-style-type: none"> • Project includes local knowledge • Project can incorporate feedback • Conveys respect • Facilitates a sense of ownership • Encourages participation 	
Incorporate Feedback	<ul style="list-style-type: none"> • Project includes local knowledge • Conveys respect • Facilitates a sense of ownership • Encourages participation 	
Understand Mental Models	<ul style="list-style-type: none"> • Illuminates beneficiaries’ perspectives and knowledge • Effective communication • Facilitates mental model building 	
Proposed Guidelines for Facilitating Mental Model Building		
Overcome Expertise <i>Actively listen to participants and develop a mental model of what they know and how they think.</i>	<ul style="list-style-type: none"> • Effective communication • Improved understanding of information 	<ul style="list-style-type: none"> • An example approach using these guidelines to facilitate mental model building in a water, sanitation, hygiene project can be found in Appendix A.
Make Associations <i>New concepts need to connect to what is already known or familiar</i>	<ul style="list-style-type: none"> • Effective communication • Improved understanding of information • Expand or revise existing models; build new models 	
Avoid Confusion <i>Too much information can be confusing while achieving clarity aids building mental models</i>	<ul style="list-style-type: none"> • Improved understanding of information • Promotes effective mental model building 	
Exploration <i>Creating opportunities for exploration helps expand mental models, develop familiarity, and improve clarity</i>	<ul style="list-style-type: none"> • Facilitates a sense of ownership • Improved understanding of information • Expand or revise existing models; build new models 	
Repeated Experiences <i>Experience is essential to create mental models</i>	<ul style="list-style-type: none"> • Facilitates a sense of ownership • Improved understanding of information • Expand or revise existing models; build new models 	

[†] Information regarding the 3CM tool can be found in source Kearney, 2015 of this document and Kearney, A. & Kaplan, S. (1997). Toward a Methodology for the Measurement of Knowledge Structures of Ordinary People: The Conceptual Content Cognitive Map.

VI. Discussion and Conclusions

While this paper's proposed alternative approach was supported through observations in field work, literature and project reviews, and a small application of this approach in a community development project, this study was limited from applying this approach in multiple projects to demonstrate their effect on project success. Applying this alternative approach to beneficiary-centered development projects would create empirical data to support the continued application of these concepts. However, even without this data, there is considerable evidence in the literature and project reviews that support the concepts and approach demonstrated in this paper. Additionally, many of the suggested guidelines and their expected impacts have been validated in other fields and applications because they are adapted from the Reasonable Person Model, a verified cognitive framework based on human informational needs.

The suggested approaches that incorporate the proposed guidelines are examples of how to foster reciprocal information sharing and facilitate mental model building in beneficiary-centered, participatory development projects. The 3CM tool has been used in a variety of contexts and demonstrated its effectiveness in understanding peoples' existing mental models; this tool can be used as an approach for fostering reciprocal information sharing. The approach for facilitating mental model building, explained in detail in Appendix A, is an additional application of the proposed guidelines. This approach, the experiences with Blose in South Africa, and the aquaponics systems training session in Peru can be used as examples for applying these guidelines to beneficiary-centered, participatory development projects. Future work for expanding this research would be the application of these guidelines to beneficiary-centered, participatory development project. These proposed guidelines could be easily incorporated into current projects because most beneficiary-centered projects include their own approaches for participation and for conducting training sessions.

As this paper demonstrated, many beneficiary-centered development projects continue to be completed based on predetermined solutions, outside agendas that overpower local knowledge, and limited beneficiary involvement in decision-making. These approaches reinforce asymmetrical flows of information from the outside organization to the beneficiaries, which limit the beneficiaries' involvement in the project, the incorporation of local knowledge into the project, and the beneficiaries' understanding of the project. Asymmetrical flows of information prevent outside organizations from understanding the perspectives, knowledge,

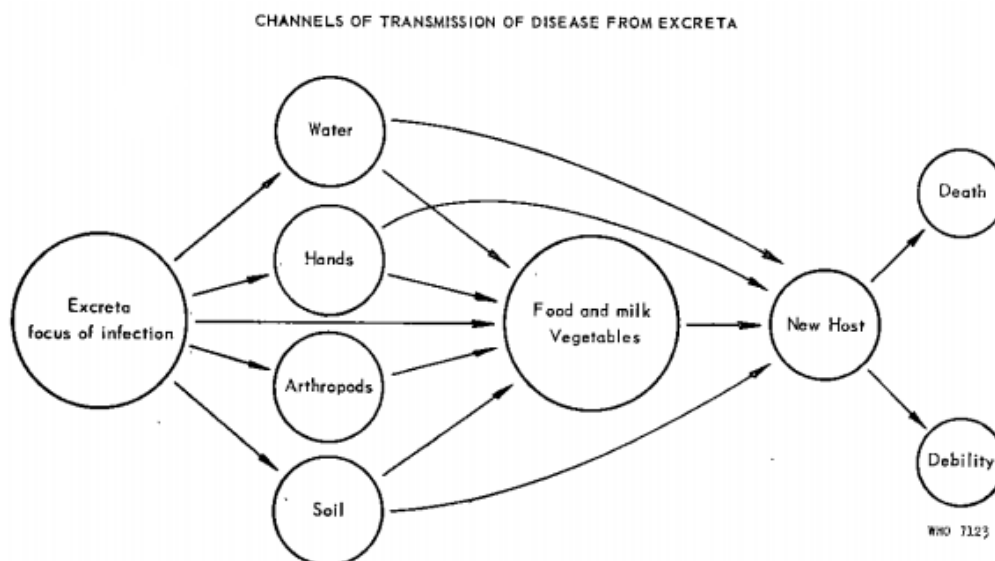
needs, values, and behaviors of the project's beneficiaries. By incorporating the alternative approach demonstrated in this paper, organizations could foster reciprocal information sharing, engage in mental model building with the beneficiaries, and address frequent difficulties that arise in beneficiary-centered, participatory development projects.

VII. Appendix

A. An example approach to facilitate mental model building in a WASH project

According to the CDC and the World Health Organization, globally, diarrheal diseases are the second leading cause of child mortality. These deaths can be prevented with safe drinking water, proper sanitation, and knowledge of safe hygiene practices. Because of this, projects that address the nexus of water, sanitation, and hygiene (WASH) are becoming more prevalent across the globe. These projects also address the pathways of fecal pathogens transmitted to an individual's mouth, commonly referred to as fecal-oral transmission. J.N. Lanoix and E.G. Wagner identified the five primary pathways for the fecal-oral transmission to occur, which are commonly illustrated in an "F-Diagram", see Figure 1A.

Figure 1A: J.N. Lanoix and E.G. Wagner "F-Diagram"³



Water, sanitation, and hygiene projects prevent the transmission of fecal-related pathogens along the pathways by using barriers, such as hand washing or sanitation facilities. Explaining these pathways to people can be difficult because the proper practices may require behavior change or it may be difficult to understand how pathogens are transmitted along the pathways. For example, to some people, the connection between feces, flies, food, and illness may be difficult to grasp; however, if these pathways are present and are not addressed, a water, sanitation, hygiene project can become less effective at preventing diarrheal diseases.

³ Lanoix, J. N., & Wagner, E. G. (1958). *Excreta Disposal for Rural Areas and Small Communities* (WHO Monograph Series No. 39). Geneva.

Additionally, since children are the vulnerable population to diarrheal diseases, it is important to communicate these pathways effectively with children.

As an approach to communicate these pathways to children effectively, an activity that facilitates mental model building was created. This approach demonstrates transmission of fecal pathogens through fingers and flies using Figures 2A and 3A. The guidelines from Table 2 paired with explanations of how this approach facilitates mental model building are listed below Figures 2A and 3A.

Figure 2A: Fecal - Oral Transmission through Fingers

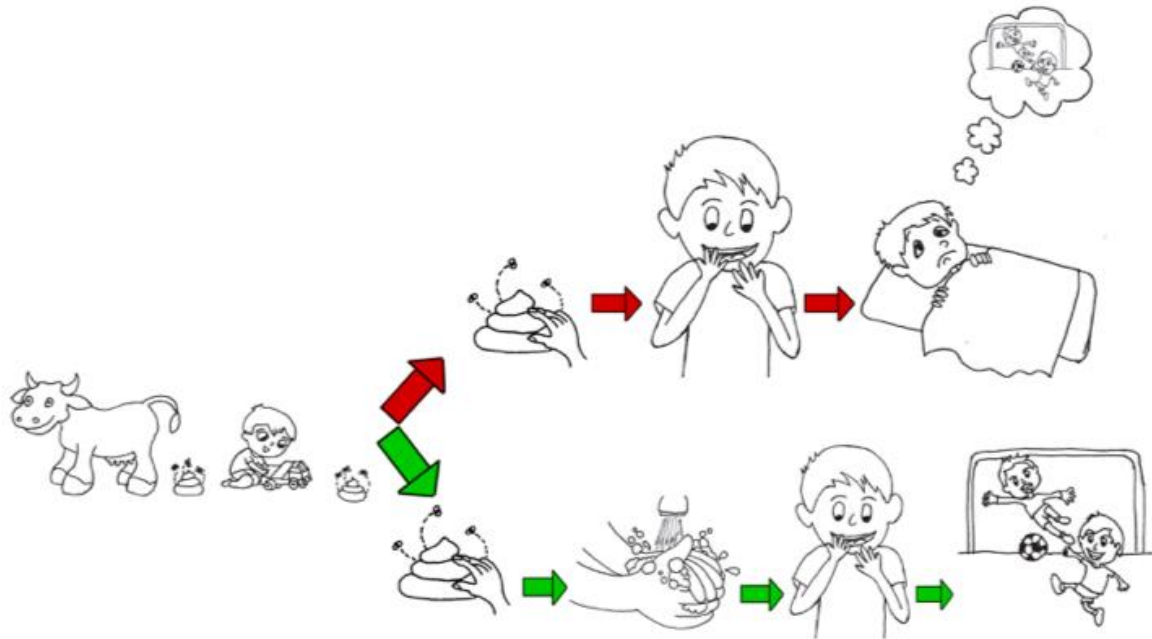
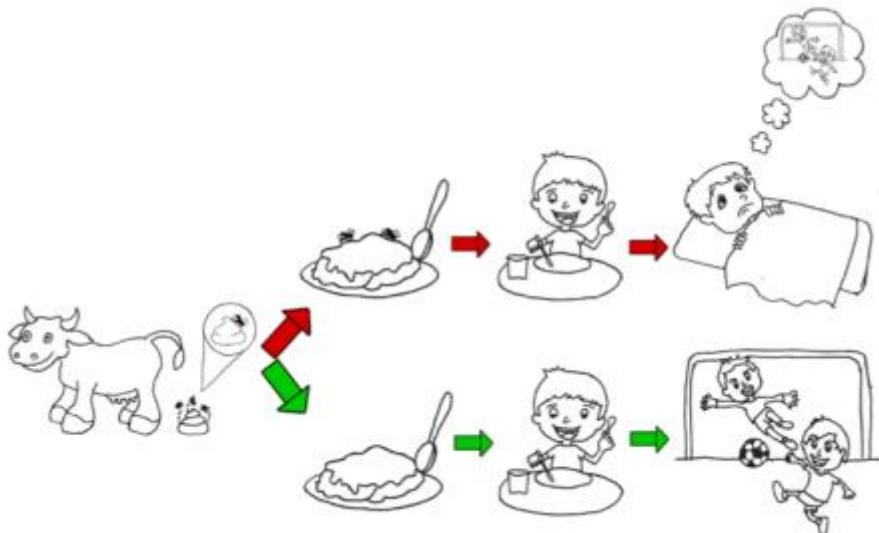


Figure 3A: Fecal - Oral Transmission through Flies



Overcome Expertise

Figures 2A and 3A were created as simple pictorial diagrams because from meetings with the beneficiaries, it was clear that there had been no previous effort to explain proper hygiene practices to children. While Figures 1A, 2A, and 3A all demonstrate the same pathways, 2A and 3A are easier to interpret if you are not familiar with the concepts of fecal-oral transmission.

Make Associations

Figure 2A has pictorial images of a child playing near feces, then the child comes into contact with feces, then the child touching their mouth, and then illness; this is demonstrating the feces-hands-new host pathway of Figure 1A. Figure 2A also has pictorial images demonstrating how to prevent illness, in this example, hand-washing. Figure 3A has pictorial images of flies on feces, then flies on food, then eating the food, then illness; this is demonstrating the feces-arthropods-food-new host pathway in Figure 1A. Figure 3A also includes images that prevent illness, in this example, no flies landing on food that is consumed. These series of images in Figures 2A and 3A are visual demonstrations of the occurrence and prevention of illness. Additionally, the children of this project's beneficiaries are constantly playing soccer, because of that, the final images are related to soccer. This is to make an association between the healthy pathway and participating in a beloved pastime and between the sickness pathway and missing the pastime. In order to make the association between these images and sickness stronger, red was chosen for these arrows because red typically signifies danger or harm.

Avoid Confusion

Figures 2A and 3A include no words or complex diagrams; this was to reduce the possibility of confusion. The figures specifically address the two pathways the children experience most frequently and directly; the information that was shared was specific to the audience. Information regarding the other pathways of fecal-oral transmission were not included because it could become confusing to relate the actions to prevent illness to the cause of illness.

Exploration

Figures 2A and 3A were designed with only the arrows colored in; this was to allow the children to color in the images. By allowing for creativity with the colors of sickness, health, or

feces, the children would be able to make these figures unique and having more time with the images. Additionally, the figures were designed with the possibility of being cut up into the images; this would allow the children to create the pathways themselves. By creating the pathways, they would engage in self-guided exploration of how these pathways are formed.

Repeated Experiences

As explained above, the children would learn the new information when the children are shown Figures 2A and 3A. The children would then be able to color the images, which would allow them to explore this new information and be creative in their own associations. The children could also arrange the pathways, allowing them to apply the information about hygiene practices, gaining familiarity with the information, and improve their knowledge of the information.

VIII. References

- Arnstein, S. R. (1969). A Ladder Of Citizen Participation. *Journal of the American Institute of Planners*, 4(35), 216–224. <http://doi.org/10.1080/01944366908977225>
- Bamberger, M., & Cheema, S. (1990). *Case Studies of Project Sustainability: Implications for Policy and Operations from Asian Experience*. Washington, D.C.
- Basu, A., & Kaplan, R. (2015a). Fostering Our Common Humanity. In A. Basu & R. Kaplan (Eds.), *Fostering Reasonableness: Supportive Environments for Bringing Out Our Best* (pp. 392–405). Ann Arbor: Michigan Publishing, University of Michigan Library.
- Basu, A., & Kaplan, R. (2015b). The Reasonable Person Model: Introducing the Framework and the Chapters. In R. Kaplan & A. Basu (Eds.), *Fostering Reasonableness: Supportive Environments for Bringing Out Our Best* (pp. 1–19). Ann Arbor: Michigan Publishing, University of Michigan Library.
<http://doi.org/http://dx.doi.org/10.3998/maize.13545970.0001.001>
- Biggs, S. D. (1990). A multiple source of innovation model of agricultural research and technology promotion. *World Development*, 18(11), 1481–1499.
[http://doi.org/10.1016/0305-750X\(90\)90038-Y](http://doi.org/10.1016/0305-750X(90)90038-Y)
- Binswanger-Mkhize, H. P., de Regt, J. P., & Spector, S. (2010). *Local and community driven development*. <http://doi.org/10.1596/978-0-8213-8194-6>
- Binswanger-Mkhize, H. P., de Regt, J. P., & Spector, S. (Eds.). (2010). *Local and Community Driven Development: Moving to Scale in Theory and Practice*. Washington, D.C.
- Chambers, R. (1983). *Rural Development: Putting the First Last*. London: Longman.
- Chambers, R. (1994). Participatory Rural Appraisal (PRA): Challenges, Potentials and Paradigm. *World Development*, 22(10), 1437–1454. [http://doi.org/10.1016/0305-750X\(94\)90030-2](http://doi.org/10.1016/0305-750X(94)90030-2)
- Chambers, R. (2002). Whose Reality Counts? Putting the First Last. *Economic Development and Cultural Change*, 50(3), 759–762.
- Cornwall, A., & Pratt, G. (2011). The Use and Abuse of Participatory Rural Appraisal: Reflections from Practice. *Agriculture and Human Values*, 28(2), 263–272.
- Isham, J., & Kahkonen, S. (2002). Institutional Determinants of the Impact of Community - Based Water Services: Evidence from Sri Lanka and India. *Economic Development and Cultural Change*, 50(3), 667–691. Retrieved from
<http://www.jstor.org/stable/10.1086/342357>
- Isham, J., & Kähkönen, S. (1999). *What Determines the Effectiveness of Community-Based Water Projects?: Evidence from Central Java, Indonesia on Demand Responsiveness, Service Rules, and Social Capital* (Social Capital Initiative No. 14). Washington, D.C.
- Kaplan, R. (2015). The Joys and Struggles of Building Mental Models. In A. Basu & R. Kaplan (Eds.), *Fostering Reasonableness: Supportive Environments for Bringing Out Our Best* (pp. 25–42). Ann Arbor: Michigan Publishing, University of Michigan Library.
- Kaplan, S. (2015). The Expertise Challenge. In A. Basu & R. Kaplan (Eds.), *Fostering Reasonableness: Supportive Environments for Bringing Out Our Best* (pp. 43–53). Ann Arbor: Michigan Publishing, University of Michigan Library.
- Kearney, A. R. (2015). 3CM: A Tool for Knowing “Where They’re At.” In A. Basu & R. Kaplan (Eds.), *Fostering Reasonableness: Supportive Environments for Bringing Out Our Best* (pp. 273–293). Ann Arbor: Michigan Publishing, University of Michigan Library.
- Kearney, A. R., & Kaplan, S. (1997). Toward a Methodology for the Measurement of Knowledge Structures of Ordinary People: The Conceptual Content Cognitive Map (3CM). *Environment and Behavior*, 29(5), 579–617. <http://doi.org/10.1177/0013916597295001>

- Kleemeier, E. (2000). The Impact of Participation on Sustainability: An Analysis of the Malawi Rural Piped Scheme Program. *World Development*, 28(5), 929–944.
- Lema, A., & Lema, R. (2013). Technology transfer in the clean development mechanism: Insights from wind power. *Global Environmental Change*, 23(1), 301–313.
<http://doi.org/10.1016/j.gloenvcha.2012.10.010>
- Mansuri, G., & Rao, V. (2004). Community-Based and -Driven Development: A Critical Review. *The World Bank Research Observer*, 19(1), 1–39.
<http://doi.org/10.1093/wbro/lkh012>
- Mansuri, G., & Rao, V. (2011). Participatory Development Reconsidered. *Development Outreach*, 64–69.
- Mansuri, G., & Rao, V. (2012). *Can Participation Be Induced? Some Evidence from Developing Countries?* (WPS No. 6139). *Policy Research Working Paper*. Washington, D.C. Retrieved from <http://dx.doi.org/10.1080/13698230.2012.757918>
- Mansuri, G., & Rao, V. (2013). *Why Does Participation Matter? Localizing Development: Does Participation Work?* Washington, D.C.
- Marks, S. J., & Davis, J. (2012). Does User Participation Lead to Sense of Ownership for Rural Water Systems? Evidence from Kenya. *World Development*, 40(8), 1569–1576.
<http://doi.org/10.1016/j.worlddev.2012.03.011>
- Mosse, D. (2001). “People’s Knowledge’, Participation and Patronage: Operations and Representations in Rural Development. In B. Cooke & U. Kothari (Eds.), *Participation: The New Tyranny?* London: Zed Books.
- Pierce, J. L., & Jussila, I. (2010). Collective psychological ownership within the work and organizational context: Construct introduction and elaboration. *Journal of Organizational Behavior*, 31(6), 810–834.
- Pozzoni, B., & Kumar, N. (2005). *A Review of the Literature on Participatory Approaches to Local Development for an Evaluation of the Effectiveness of World Bank Support for Community- Based and -Driven Development Approaches*. Washington, D.C.
- Prokopy, L. S. (2005). The Relationship between Participation and Project Outcomes: Evidence from Rural Water Supply Projects in India. *World Development*, 33(11), 1801–1819.
<http://doi.org/10.1016/j.worlddev.2005.07.002>