A Critical Learning Cycle Model for Sustainability Education: Two Case Studies of Water Conservation Programs in Jordan

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ABSTRACT

Sustainability education for adult learners implicitly and explicitly forms an important component of participatory sustainable community development programs that have become commonplace as part of international development practice. Community-based sustainability education programs for adults vary in their focus on content and process. Defining learning as making meaning that leads to action, we use a critical learning cycle model to analyze learning processes in two water conservation programs in Jordan, one of the world's most water scarce countries, where sustainability education is an important part of the national water management strategy. In this model, which incorporates inspirational learning and experience-based learning, learners integrate insight and experience to create meaning and to take action. We present the findings from detailed case studies of the two programs, one of which takes a content-oriented approach to sustainability education and the other a more process-oriented approach. We used qualitative research methods including ethnographic observations and in-depth interviews with program managers and participants that we analyzed through emergent thematic coding and validated with member-checking and peer review. We observe that the process-focused program was more successful in fostering individual-, household-, and community-level change than the

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content-focused approach. We conclude with recommendations to develop community capacity to address complex environmental challenges including process-oriented approaches that incorporate internal learning processes and multiple cycles of experience-based experimentation. In these approaches, learners are able to apply what they have learned and test ideas as they develop a more thorough understanding of the problems at hand and their potential solutions while engaging in culturally appropriate forms of expressive self-reflection to make new ideas meaningful.

INTRODUCTION: INTERNATIONAL PARTICIPATORY COMMUNITY DEVELOPMENT AND SUSTAINABILITY EDUCATION

International development practice was transformed in the 1990s thanks to the confluence of growing interest in environmentally sustainable development (e.g., United Nations, 1987; World Bank, 1993) and participatory community development (e.g., Binswanger-Mkhize, de Regt, & Spector, 2010; Chambers, 1983; Narayan, 1994; World Bank, 1996). Environmental offices in donor organizations that previously had been ignored were pushed to the forefront (Adams, 2001), and participatory projects in which stakeholders had a greater role in design and implementation gradually took root, challenging the traditional top-down approach in which outside experts designed projects for local people who served as passive recipients (Binswanger-Mkhize, et al., 2010). Interest in collective action, spurred by a greater appreciation for both the necessity and the ability of community groups to jointly manage natural resources vital to their livelihoods (e.g. Ostrom et al., 2002) further contributed to the surge in community-oriented projects working toward sustainable development.

Sustainability education has received relatively little attention in the context of international community-based sustainable development. However, for humans to respond to dynamic environmental contexts, we will all have to learn quickly about our local environments; thus, "the sustainable society, by definition, will be a learning society" (Sterling, 1996, p. 210). Moreover, increasingly urgent social, environmental and economic challenges to development mean that we cannot wait for students to become adults and solve complex transdisciplinary problems in twenty years; we must educate and reach adult populations now. Thus, sustainability education advocates experiential learning for adults in informal community settings (Clover, 2002; Niesenbaum, 2001; Palmer, 1998; Shelhas, 2000; Slangen, 2000).

Sustainability education also is similar to international community-based sustainable development in its focus on participatory collaborative processes. Wals and Bawden (2000) argue that although the term sustainability can be criticized for being too vague, too broad, and too popular, these weaknesses can become strengths in that vagueness requires discussion of precision, broadness welcomes multiple perspectives, and popularity encourages open dialogues of differing viewpoints. Thus, "teaching for sustainability...is only a legitimate educational goal when the learners are given space for autonomous thinking and self-determination to decide for themselves what counts as sustainable living" (Wals & Bawden, 2000 p.9). Sustainability education aimed at contextualized experiences that impact people directly in their homes, communities and lives complements participatory, community-based development.

Likewise, experience-based learning is integral to participatory community development because it builds from community members' own experiences in their local contexts, addressing their concerns in ways that they determine to be appropriate. In short, "[e]ducation for sustainable development aims to help people to develop the attitudes, skills and knowledge to make informed decisions for the benefit of themselves and others, now and in the future, and to

act upon these decisions" (UNESCO, 2007). Rather than a focus on outcomes and content, such education focuses on "the processes of thinking and learning" (Palmer & Birch, 2005, p. 121). This distinction is key: traditional "knowledge deficit" (Schultz, 2002) or information dissemination approaches to education view the student or learner as an empty vessel to be filled with knowledge from experts. Thus, experts or professionals determine the appropriate content, or messages, to be transmitted to targets, and devise curriculum or training sessions in which the learning will take place. Wals et al. (2008) refer to this process as an instrumental learning approach to sustainability education; the instrumental approach assumes that experts know, can specify and agree upon, then influence individuals' behaviors through education or communication. However, in process-focused learning, the learner directs the process, focusing on the exact issues that she experiences in her life. "[A]t its center, the process of learning and action is owned by participants and it's up to them to determine when/if/how to act" (Fagan, 1996, p. 140).

Moreover, experience-based learning takes place in real life situations, not just in abstract classroom contexts. Educational approaches that are process- and experience-based offer much to educators, particularly to develop collaborative learning opportunities that go beyond attitude and behavior change to foster people's capacities to sustainably manage and conserve resources (Poudel et al., 2005). One such approach is the Critical Learning Cycle Model, first summarized by Bawden (1998). A systemic framework to understand complex learning processes in community contexts, this model recognizes the insights and experiences influencing how people understand their world.

This paper examines how learning contexts and program approaches impact women's learning in rural water conservation programs in Jordan, addressing the implications of learning processes for the success of community sustainability education programs. First, we contrast content-driven with process-focused education approaches, introducing the Critical Learning Cycle Model as a process-based framework for understanding learning in practice. After describing the qualitative methods we used in the study, we explore how two water conservation education programs in rural Jordan approached learning. The model helps us identify strengths and weaknesses of each program. We conclude that participatory, local- or community-based initiatives should include critical learning processes. Thus, we recommend that sustainable development and education practitioners design and test innovative learning approaches, adapt to community contexts and empower community members to address more effectively their shared resource challenges.
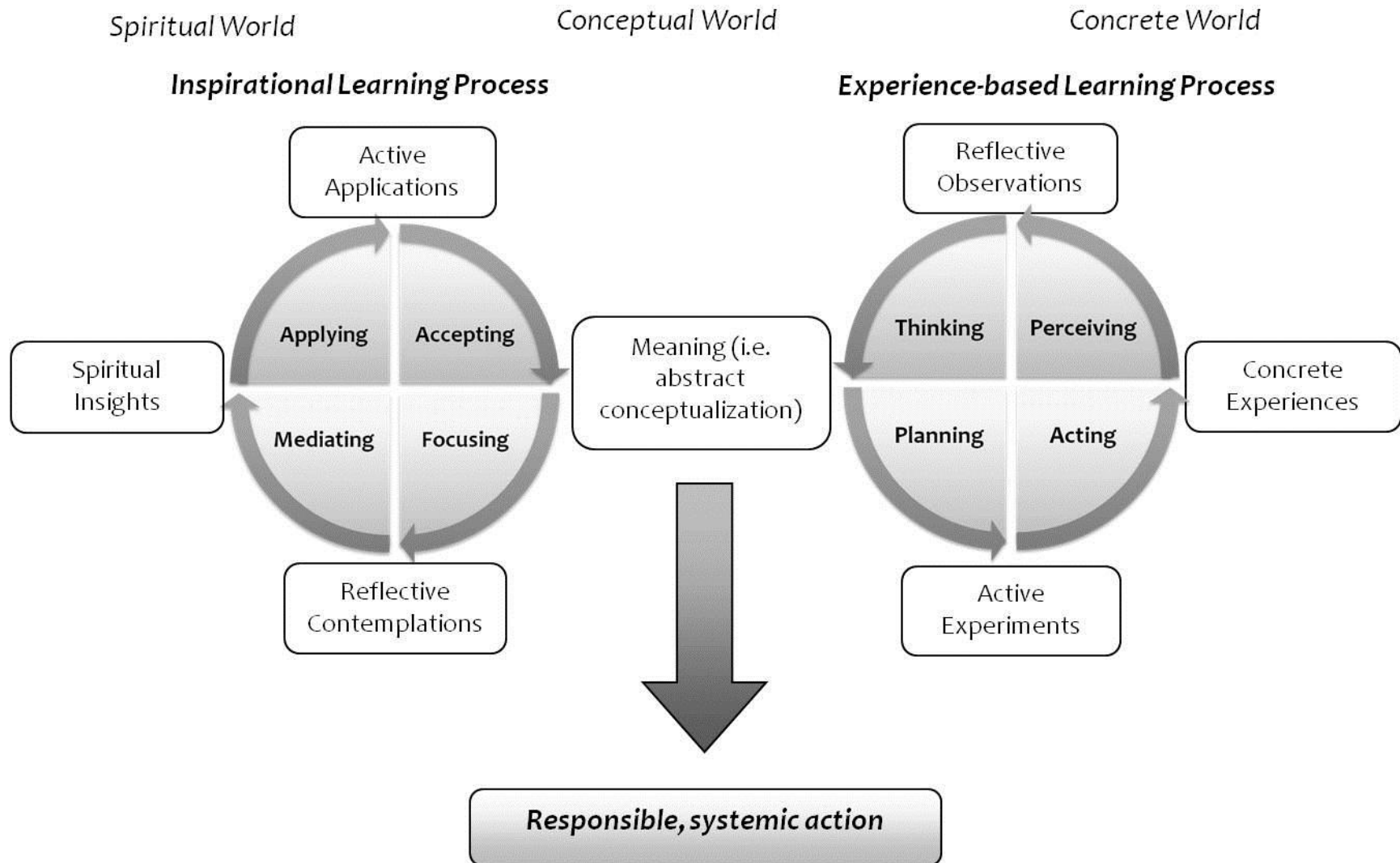
THE CRITICAL LEARNING CYCLE MODEL

The Critical Learning Cycle Model unites a systemic understanding of complex natural and social systems with processes that recognize the complexities of learning and action (Bawden 1998). This model is consistent with contemporary constructions of sustainability education, in which scholars call for learning that transcends a simplistic focus on ecological knowledge and call for deep, critical understanding of social contexts that constrain sustainable behavior and systemic change (Frisk & Larson, 2011; Wals, et al., 2008).

The Critical Learning Cycle Model details the processes *through which* one learns. Placing the learner central to the process, learning encompasses more than simply transferring information or changing behavior. Learning is *making meaning that leads to action*, the process by which one understands one's world and responds to it; we use this conception of learning as meaning-making throughout this paper. For Bawden, meaning emerges from two processes—

inspirational learning and experience-based learning[1] (Bawden, 1998, p. 45). Thus, critical learning encompasses the inner spiritual world (inspirational learning), the concrete world (experience-based learning), and the conceptual world (meaning-making). In short, learners integrate insight and experience to create meaning and to take action (Figure 1). Compared to content-focused education, which puts little emphasis on the role of real-world experiences or an individual's insights in the learning process, Bawden's model (1998) offers a process of learning that does not depend on expert teachers and blank-slate students.

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[1]We use "experience-based learning" instead of Bawden's original "experiential learning" to avoid confusion with other common usages of "experiential learning, " which can imply multiple theorists' work or generalized pedagogies (i.e. "hands-on learning,"). It is our belief that "experiential learning" has, in some circles, become a vague term to describe almost any sort of practically applied learning approach.

Figure 1. The Critical Learning Cycle Model (from Bawden, 1998, 46)

Spiritual World   Conceptual World   Concrete World

Inspirational Learning Process   **Experience-based Learning Process**

Active Applications		Reflective Observations
Applying Accepting	Meaning (i.e. abstract conceptualization)	Thinking Perceiving
Spiritual Insights		Concrete Experiences
Mediating Focusing		Planning Acting
Reflective Contemplations		Active Experiments

Responsible, systemic action

Inspirational Learning Process

Bawden's conception of inspirational learning recognizes and validates insights people gain while learning. The inspirational learning cycle integrates two sources of understanding, concepts and insights, and two ways of transforming them, contemplation and application. In this process, one first disengages from one's conceptual mind, thereby freeing the mind for open, reflective contemplation. One then engages with what Bawden calls the "innermost being" (1998, p. 53). Here, one finds insight. Finally, one accepts insight and integrates it into one's understanding of the world.

Experience-based Learning Process

Experience-based learning is the process by which we understand our worldly experiences, the things that happen to us, and the process by which we transform that understanding into action. First, one experiences something external to oneself and perceives that experience through the filter of one's worldview. Bawden (1998) explores different worldviews and their impacts on how one interprets the world, but for the purposes of this paper, what is important is that one's previous understandings of the world, one's learned ontology and epistemology, frames the way that one interacts with external experiences. Thus interpretation of the experience is affected by prior meaning-making. Next, one reflects on the experience, seeing how it fits or does not fit with one's notions of "how things are." This is how one determines what the experience *means*. Often, one then plans a response, acts on it, and in some way affects the experience itself. Then one is interacting with a changed experience so the cycle begins again: perceive, understand, respond, and experience. Thus for us, experience-based learning is more than hands-on demonstrations; it requires the freedom for learners to examine what they wish to examine in the ways they wish to do so, and take actions they deem appropriate.

WATER SUSTAINABILITY IN JORDAN

One of the world's driest countries, Jordan faces a severe water crisis (Abushams, 2004). In per capita water consumption, Jordan is the 4th water poorest nation on the planet (Ministry of Water and Irrigation, 2009 p. 2-1). Household water scarcity imposes high social costs (Academy for Educational Development, 2005; Potter & Darmame, 2010), and international organizations agree that Jordan's biggest development challenge is the lack of water in the country. In 2007, Jordan's groundwater was being used at twice the recharge rate (Ministry of Water and Irrigation, 2009 p.3-2). This dramatic overuse is highly unsustainable, and has long been considered "the most essential and the highest priority issue" in the nation's political and development landscape (Ministry of Water and Irrigation, 2009 p. i). Dealing with the crisis requires changes at all levels. While considering investments to increase water supply, for example through projects like the Red-Dead canal and the Disi Water Conveyance project, Jordan is also working to reduce water demand and improve water efficiency.

Water conservation education has become a standard part of Jordan's K-12 education (Middlestadt et al., 2001). For adults, Jordan increasingly employs rural community-based water education to help citizens cope with drastic water shortages (Hansen, 2010). Nationwide public awareness campaigns have been launched but have not resulted in lowering water consumption (Academy for Educational Development, 2005). By contrast, some non-governmental organizations' (NGOs') rural water conservation education programs appear to have resulted in limited, individual-level behavior change. This study examines in detail the education approaches of two different semi-rural community-based water conservation programs to assess how participants made new information about water meaningful to them. The Badia[2] program

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[2] We replace these and all other names with pseudonyms to protect the confidentiality of research informants.

was driven by content, delivering new information to women participants. The Ghor program, on the other hand, focused on cyclical critical learning processes to enable participants to address their water challenges.

METHODS

We conducted qualitative research for 18 months over three years from 2006 to 2009, examining learning processes in two water education programs in rural Jordan. Given limited pre-existing knowledge, the research required an exploratory, qualitative approach to investigate the process by which participants made messages meaningful.[3] Qualitative methods are used to explore open-ended research questions, allowing themes to emerge from participants' perspectives (Maxwell, 2005; Patton, 2002). These methods help uncover "cognition, affect, intentions and anything else that can be included in...the 'participants' perspective'" (Maxwell, 2005, p. 17). Thus, interviews explored participants' learning, investigating what they learned from the programs and how they made new information meaningful.

We explored two water education programs as in-depth case studies, following each program and its impacts on participants' lives, what Reinharz describes as analyzing "the relation among parts of a phenomenon" (1992, p. 164). Case studies are not limited to one particular method of data collection or analysis but instead use multiple sources to converge on the issue in question; they can be understood qualitatively or quantitatively (Yin, 1998). We used three sources of data: professionals in the water sector in Jordan, community participants, and program documentation.

Data Collection

We used semi-structured interviews (Rubin & Rubin, 1995) to examine the programs from the perspectives of those designing, implementing and participating in them. First, we elicited the perspectives of those professionals most involved in water education programs and those community members who participated in the programs, using purposive snowball sampling to locate informants (Patton, 2002). The field researcher, Hansen, spoke with Jordan's water sector professionals who then recommended other interviewees. After about three months, she had exhausted all the informants directly involved in household and community-level water education programs and had met with people from across Jordan's government, non-governmental, and private sectors involved in water issues. In all, she interviewed formally 38 professionals and had informational meetings with six others. These discussions were all in English, the professional language in Jordan.

Hansen located community informants through program professionals. She visited eight program sites with staff and discussed the programs informally with participants. Based on these site visits and interviews, we selected two rural settings for case studies of programs and impacts on participants. We focused on cases with women participants for two reasons: first, women were the primary targets of the Badia program and led the Ghor program; second, as a female researcher, Hansen had the unique opportunity to study women's perspectives, which previous studies had not been able to access. Moreover, women were becoming the targets of many efforts in Jordan, where household chores and most household water use were perceived as "women's work." Hansen interviewed sixteen women in the two villages, often with a translator. She also conducted ethnographic observations (DeWalt & DeWalt, 2002; Schensul, Schensul, & LeCompte, 1999), living with families for about eight weeks in each community, participating in

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[3] For more details on the method of study see Hansen 2010. Hansen, L. (2010). *Bridging community development and environmental education: Rural water conservation programs in Jordan.* Unpublished Ph.D. Dissertation, Michigan State University, East Lansing, MI.

their daily lives and in program activities. In interactions with community members, she used Arabic or mixed Arabic and English to communicate.

Data Analysis

Village-level data included written program materials, interviews, and observation notes. With informant permission, Hansen recorded most interviews and transcribed them with the help of Jordanian translators. She wrote detailed observation notes and collected written materials, consolidating them into memos describing each program. Addressing issues of data validity is critical in qualitative research (Miles & Huberman, 1994; Patton, 2002). To ensure accuracy of the data, two transcriptionists reviewed each interview transcript. Two Jordanian translators also reviewed all Arabic transcriptions to ensure accurate translation.

To understand the learning process and content, Hansen developed emergent thematic codes from a subset of the data, seven documents that included all types of data (Miles & Huberman, 1994). Codes are a way of categorizing data by the topics or themes they address. From these, she created a coding rubric with the name of the code theme, definition, rule for application, and examples. To validate the reliability of coding analysis, (i.e. data validity) Hansen used the peer review method of Miles and Huberman (1994): three researchers tested the coding process to ensure consistency and check that important information was not neglected. They compared coding, clarified the glossary and ensured that Hansen was applying the codes consistently. With the improved code glossary, she recoded the first sample and coded the rest of the documents.

After coding was complete, Hansen used Atlas.ti to separate key themes that applied to the research questions, developed summary matrices to analyze them, and categorized responses (Miles & Huberman, 1994). For example, to make sense of all the data about learning content and process in Jordan, she first selected all data coded "learning content" and created a table summarizing each informant's views about learning content. She performed the same steps for "learning process" coded text, adding each informant's views of learning process to the previous table. Thus she could examine each informant's perspective on the learning process and content and compare the two. She then separated the informants from each of the two case study programs to summarize and compare the programs.

Member checking validated the findings (i.e. interpretive validity) in two ways. First, Hansen often discussed her observations with informants, clarifying her interpretations and honing her comprehension as per LeCompte & Schensul (1999). Second, she presented the results of the interviews at a public meeting attended by 11 of the professional informants and incorporated their feedback into the final analysis, as per Kruger and Casey (2000). We present the results of this analysis process here, using illustrative quotes to demonstrate emergent themes.

RESULTS

Content-Focused Learning in the Badia Program

Badia is the name of Jordan's northeastern desert region, where water is particularly scarce. The Badia program aimed to raise awareness of water scarcity and increase household efficiency in water consumption in semi-urban communities with severe water stress. Most community members received less than two cubic meters of water each week for their families, often reserving some of it for household gardens. Professionals from multiple NGOs and government agencies designed the program, and a Jordanian NGO implemented it in five communities around Jordan, training 10-17 local women in each as "water leaders." We studied one of these communities and the 12 water leaders there. The NGO staff included a male manager and five female trainers who interacted with community members. According to

planners, participants were supposed to "transfer their knowledge to their people" by sharing it with neighbors and relatives in the village. The village is growing, approaching 5000 inhabitants, and it is a suburban mix of agricultural families, newly arrived homeowners, and Iraqi refugees (Hansen, 2010),

Professionals in Amman, the capital city, determined that rural women needed to learn more about Jordan's water situation to encourage them to use less water to accomplish more tasks. First, program staff met with village women to determine what the community already knew about water. A consultant compiled materials from previous water education efforts in Jordan, adapting relevant material into an eight-module curriculum. The trainers then taught the information to the participants, presenting one topic about every month in one- or two-day workshops in each community.

Planners used an information dissemination model but included elements of participatory feedback. Based on the assumption that professionals or experts could determine what participants should be taught, information about water conservation flowed in one direction: from expert curriculum developers to trainers to participants. However, the early work with program planners to discuss what participants already knew could be described as what Cornwall (2003) calls instrumental participation: participants were included in the planning process to make the project run more efficiently, but they did not influence program design or implementation.

The workshops engaged the adult participants and followed many professional guidelines for adult learning, e.g., NAAEE (2004). Trainers presented material in a discussion format using direct participation, encouraging learners to raise issues and ask questions. "It was not like lecturing, you see, they were not receivers of the information, they were participating" said one trainer. Additionally, participants felt physically and mentally comfortable during learning experiences; five of the participants said that because the trainers were women, they felt comfortable engaging with them in spirited discussions that, for cultural reasons, would have been difficult with male trainers. The participants were also comfortable because the content was presented clearly; said one, "They made a big effort for everyone to understand." Moreover, since adults "bring diverse life and learning experiences" (NAAEE, 2004) to community programs, participants were invited to share their own ideas of water conservation techniques, whether original or previously used by villagers. For example, when participants argued that drip irrigation systems were too expensive, trainers asked them to brainstorm other options. One idea was to pierce old plastic bottles or metal cans and let them drip water onto the plants.

The information dissemination model in the Badia program did enable participants to learn some new information. Also, in line with the program's goals, participants shared the new information. Program participants were interested in talking to people about water conservation; learners said that they often discussed water conservation, even when they were socializing. Said one, "Wherever I go, I tell people what I was taught, not just here … but in Amman too. I tell people how to use water and if I go as a guest [to someone's house] and hear a tap dripping, I'll tell them that the tap should be fixed."

However, participants spread the information in ways program planners did not expect. Rather than going house-to-house throughout the village, participants talked to their immediate and extended female relatives. Thus, only women related to participants learned the new information. Moreover, though one of the modules covered teaching techniques, participants did not practice teaching other women. Though trainers understood adult education, they did not teach the participants about adult education techniques, so participants relied on brochures and lectures. As one program participant put it, "I read the brochures…to the women I talk to. I explain my points to them ...I am like a professor."

The Ghor Program: Process-Focused Learning

Ghor is Arabic for the Jordan Valley, where water is also scarce but much less so than in Badia. The Ghor program aimed to build collaborative networks to improve marginalized people's access to water resources. This program took place in three countries over four years. The first two years focused on developing national and international collaboration, testing tools and methods, training staff, and similar tasks. During the second two years, it was implemented in six villages in the Jordan Valley, and we studied one of these sites. This village of more than 3000 people had once been an agriculturally focused community, but then some families gained income from city jobs, and previous farm workers were displaced by migrant workers (Hansen, 2010). According to program documents, 75-80 percent of inhabitants were unemployed.

Official project support in Ghor ended in 2007. Initially the program was content-driven. Staff believed they needed to raise awareness about Jordan's water situation, so trainers lectured to participants about water conservation and other topics before the community team had an opportunity to examine the local water situation. Concurrently, staff developed an experience-based cyclical learning process in which a collaborative community team investigated community water issues. Program reports stated:

> The idea of a cycle reflects the reality that good local water governance is about a continuous process of experimentation, adaptation and learning, which makes it possible to find locally appropriate solutions. Long-term visions and strategies need to be updated regularly based on new information and the impacts of activities on the ground.

This team started with the local women's association and then added men, yet women remained key leaders. The community team conducted a water study: they measured water flow rates, recorded days water was pumped to the village, surveyed residents, and consulted geological studies. They found that while most households had access to about two cubic meters of water weekly, some received as much as eight cubic meters—a large volume by global standards – and others received none at all. Trained staff brought the community team together with local government agencies to dialogue about local water issues. Together, they developed a water resources strategy for current and future water use in which they prioritized shared problems. They focused on improving household infrastructure and on water distribution inequities, because homes at higher altitudes did not receive water due to low system pressure. Then, after considering possible solutions to prioritized problems in line with their long-term strategy, the community team developed two pilot projects. To address the water distribution, the program purchased a tanker truck to deliver water to households without access. It also began a revolving loan fund to help families pay for home improvements such as building grey water facilities or storage tanks. These pilot projects demonstrate community change and empowerment in the Ghor program. The water tanker responded directly to villagers' needs: the idea came directly from the villagers and they lobbied local water authorities for support. The revolving loan fund also helped develop community members' capacities: the local women's association staff members learned to manage the fund and individual debtors take responsibility to pay back their loans in a timely manner.

Program planners hoped to create a sustained community team for learning and change. Program reports note:

> A participatory approach cannot be achieved unless suitable skills are being acquired such as facilitation, negotiation, appreciation of information, the art of dialogue and acceptance of others. These skills can be acquired during the process but need a lot of patience and understanding of the local customs and of power relations. It needs a good level of trust and respect in the working team.

However, after the pilot projects ended, the community team no longer met and did not monitor whether the tanker delivered water.
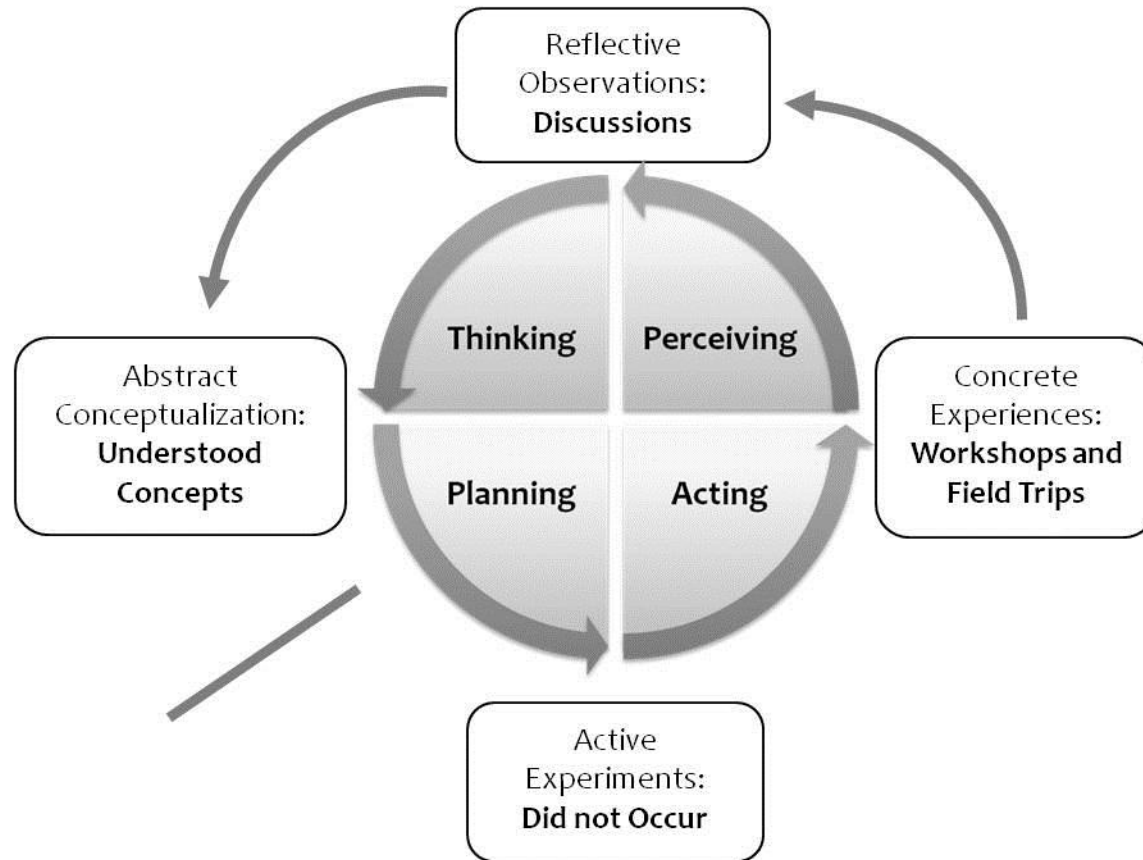
DISCUSSION: USING THE CRITICAL LEARNING CYCLE MODEL
Content-Focused Learning

The Badia program intended that awareness would lead to individual behavior change in water practices, but in the community we observed many ideas about and uses of water contradictory to program messages. Why did this program fail to change individual behaviors? First, although participants had input, their major concerns, including water quality and poor infrastructure, were not part of the curriculum so participants remained incapable of addressing their greatest challenges. Second, the content-focused education did not motivate attitude or behavior change, a research finding that is consistent with numerous other studies (Schultz, 2002). Badia program staff agreed, saying "just raising awareness isn't enough" to create real change, yet they were unable to alter the program designed and funded by their superiors (Hansen 2010). Third, the program failed to address underlying emotions, beliefs, social norms and structural barriers affecting water use. For example, Hansen saw one of the participants help three other families repair leaking taps in their homes. Nevertheless, that same participant had a leaking tap in her own house that she did not repair. When asked, she stated, "We rent our house, it is the landlord's job to repair it and he won't come." While she agreed that leaks were a problem, fixing the leak was contrary to social norms about who should be responsible for rental household repairs. A learning process that encouraged her to examine these social norms or other behavioral barriers could address this issue. Perhaps the issue is one of funding where she does not want to spend money improving the rental home, so the program could assist her in negotiating with her landlord or it could provide economic incentives to cover the cost of repairs. As sustainability education increasingly emphasizes learner-centric and experiential processes, it can be more open to these wider social forces (Bawden, 1998; Palmer, 1998).

The Badia program demonstrates that the information dissemination model, even when including participant feedback in planning stages and using participatory education methods, does not create sustained behavior change across the community. Experience-based learning, as defined by the CLC Model, on the other hand, has the potential to build not only consistent behavior change, but other participant capacities, such as systems thinking, problem-solving, and experimenting with new ideas (Bawden, 1998; Frisk & Larson, 2011; Wals, et al., 2008).

Figure 2. Badia Water Education Program Elements within the Critical Learning Model's Experience-Based Learning Process.

Experience-based Learning

The Badia program focused on adult learning but did not incorporate the Critical Learning Cycle's conception of experience-based learning. Participants were not encouraged to test different conservation efforts. For example, as a group, they did not experiment with bottle drip irrigation to see if it actually saved water and plants survived. Only one of the participants tried this irrigation method. She said she was using less water; however, her sons filled the bottles so the increased time and labor expended were not her own. Whether or not this approach would be technically or economically viable for others is not certain because no one else tested it. Returning to the Critical Learning Cycle Model, the learning process in the Badia program stalled (Figure 2); participants were confronted with new experiences through the workshops and occasional field trips, and they interpreted these experiences, discussed them, and came to understand them. There, however, the process ended; there was no active experimentation. Thus, the information learned was merely conceptual; without practical experiences, the new information did not become *meaningful* to participants.

Interestingly, participants wanted more experience-based learning activities, as did program staff. Participants requested hands-on practical training in plumbing. They wanted to be certified as plumbers so that they could get paid to make repairs around the village. Not only did they want to find a way to make money, but they wanted the social authority that would come from being certified plumbers. Professionals also stated that the program needed more experiential sessions. Said one extension agent, "I think it's always more important, or is easier to understand when you are practicing rather than only seeing or hearing....We need more practical sessions." Another official from one of the program's funding agencies believed that the program should increase opportunities to "teach hands-on." However, the program was limited by the funding and design at the time: the funders supported only the creation and implementation of the specific awareness-raising modules and additional funds were not available to respond to these concerns. Recently, the program has expanded to encompass more practical methods. For example, staff members have designed a handbook for community women to use in teaching other women, and they are developing a detailed plumbing course for participants.

The Ghor program's cyclical learning process exemplified the CLC Model's Experience-based Learning Process (Figure 3), although it was cut short before it could yield lasting change. Most participants lived the *concrete experience* of water scarcity in their daily lives. To more fully understand the situation in the village, the team conducted a water study, a collaborative *reflective observation* in which learners conceptualized what the study meant. Developing the water resources strategy, they engaged in *abstract conceptualizing*. The pilot projects were *active experiments,* both in addressing water concerns and in collaboration.

Figure 3. Ghor Water Education Program Elements within the Critical Learning Cycle Model's Experience-Based Learning Process.

As mentioned, even this experiential process did not result in lasting behavior change. The Critical Learning Cycle Model's experiential learning process is a continual cycle, with multiple recursive opportunities for people to experience, reflect, understand, and act. Although staff stated that the learning process is continual, the Ghor participants almost completed one cycle, but lacked the opportunity to evaluate or adjust the pilot programs and the Ghor program staff did not continue to support the village-level team. Thus the community team did not learn how to respond to continually changing contexts. Also, community team members did not practice water management skills and instead gained only the specific capacity to implement rolling loan funds. Moreover, the water tanker pilot project did little to address unequal water distribution. Since those without water had little political or economic power in the community (Hansen, 2010), those with access had little motivation to reduce their consumption or to lobby for continuation of the water tanker deliveries after the end of the program. The program failed to create a united community team, so there was no momentum for further collaboration. To engage community members for long-term capacity building, participants would have to practice these processes repeatedly, actively experiment, and develop a collaborative purpose to overcome their differences.

Inspirational Learning

The Critical Learning Cycle Model reveals another realm that both programs neglected. Bawden recognizes that internal factors are important for learners to find meaning. We saw this when Badia participants visited a large water treatment plant in a neighboring community. Participants listened to engineers describe the water treatment process, toured the facility and watched a video repeating the engineers' information. After the trip, one participant said she would never drink water from that plant while another said she would. Since two participants who shared the same experience and information came to opposite conclusions, it is clear that information becomes meaningful through additional, individual and internal processes. One program staff member noted this, stating that learning is a "step-by-step process [that] comes from inside the individual." In the Ghor program as well, opportunities for inspiration and creativity were lacking.

In both of these cases, incorporating inspirational learning activities in program planning could improve participants' learning. Culturally-relevant reflective and expressive exercises might encourage participants to move beyond their preconceived notions and access internal insights (Meyer & Munson, 2005). In Jordan, storytelling, singing, and writing poetry are also culturally relevant expressive exercises. Prayer is as well, including conversations with God during and after the five daily prayer times. Programs should encourage such moments in which one is open to inspiration. Even the active experimentation phase in the experiential process could be influenced by inspiration and creativity. Rather than two community-wide pilot projects in the Ghor project, villages could have implemented multiple innovative projects in a few households, each to be compared and adjusted over time. Moreover, creative ways of using new forms of social interaction found in the village, from the internet to cell phones, could have been considered for addressing larger-scale concerns.

Systemic Change and Sustainability Education

One of the fundamental strengths of sustainability education is its focus on systemic change. Yet this same focus on integrating the social, economic, and environmental spheres in community development work was lacking in the programs we studied. Even the Ghor program, which attempted to develop in participants capacities that would empower them beyond water conservation awareness and individual behavior change, did not achieve its aims. Hansen (2010) describes a number of reasons for this, including community power inequities and gender relations, yet sustainability education includes such issues in education efforts.

Given that program designers in these two case studies were aware of the need for more than awareness-generating programs or information-dissemination processes, why then, did more elaborate systems for meaning-making among learners not occur? We agree with Cash et al. (2003 p. 8090), who observe that "building more effective knowledge systems for sustainability takes time and patience." The programs we studied, like most development programs, work on short funding cycles, typically 2-5 years. Longer-term funding processes by agencies and NGOs would allow for multiple cycles of innovation, experimentation, reflection and adjustment on the part of learners and communities. In fact, Cash et al. (2003 p. 8090) recommend periods of 10 or more years for planning, implementation and evaluation of such endeavors; these authors note the need for a "sufficiently long-term perspective that takes account of the generally slow impact of ideas on practice, the need to learn from field experience, and the time scales involved in enhancing human and institutional capital necessary for doing all these things." However, this does not mean that large, expensive programs must exist for decades. Rather, small, nimble funds could be continued over long periods, building community members' capacities and confidence.

Moreover, the freedom to experiment must be expressly included in planning processes. Community members know that if they offend funders, they will lose support, so they are justifiably nervous about taking risks. It is safer for them to follow the stringent criteria set by others so that even if their programs do not work well, they cannot be blamed. This fear of blame extends to sub-contracted implementers, who create detailed monitoring and evaluation plans to protect themselves from blame in case of weak project results. An honest and critically reflective learning cycle allows community members, program staff, and funders to be seated equally in the process, to address these types of concerns, and to make room for risks, failures, and the learning that comes from trying new ideas.

CONCLUSION

From our research, we conclude that community-oriented sustainability education efforts should pursue process-focused learning approaches to help empower communities to address water sustainability challenges. In contrast to content-focused approaches that primarily transmit specific messages or content to learners, process-focused education, such as the Critical Learning Cycle, empowers learners to explore issues important to them in multiple cycles of experiencing, reflecting, understanding, and acting. Our study was limited in that it focused only on two villages and only two programs, one content-focused and one process-focused. Yet our qualitative research examined the *processes* through which people learn; we did not aim to generalize about impacts across the range of all possible project sites or approaches.

The Badia case study exemplifies the weaknesses of information dissemination methods in motivating behavior change. Though the Badia program's approach was consistent with many of NAAEE's recommendations to reach adult learners, participants did not enact some desired program outcomes, such as grey water reuse, drip irrigation, and rainwater harvesting. Moreover, the Badia program did not address social norms, structural barriers, or incentives for systemic change, all of which are recognized as challenges and opportunities in sustainability education (Frisk and Larson 2010).

Overall, the Ghor case demonstrates how a process focus can be more successful in fostering some change than the Badia program's content focus. However, although the Ghor program did allow participants to implement pilot projects, it did not continue to support further adaptation and learning. In contrast, the Critical Learning Cycle Model suggests the benefits of a longer-term approach that allows multiple cycles in which learners can "experience, reflect, understand and act," as well as space for inspiration. For example, participants could be

encouraged to experiment with a variety of ideas in each household, to compare results or even to compete to see whose ideas saved the most water in a month. To encourage inspiration, participants could create children's stories, short plays, or poems describing how they feel about water and its central importance in their lives. Thus, participants would be thinking critically about what inspires their emotions around water.

We recommend that sustainability educators increase process-oriented approaches such as the Critical Learning Cycle Model to sustainability education in support of participatory community development. Defining learning as *meaning-making*, our research demonstrates what many practitioners already know: that some parts of learning are internal to the learner. However, the CLC Model suggests that encouraging experiential *and* inspirational opportunities for learning and action can build learners' capacity to change their actions and to adapt iteratively to complex changes within communities, both of which are essential for sustainability education (Wals, et al., 2008).

First, both the Badia and Ghor programs demonstrate an interrupted learning cycle. In the former, the program stops short of active experimentation whereas in the latter it halts after just one cycle of experimentation. Both programs could have benefited from a sustained process of experimentation. Thus program staff can increase support at these critical junctures and commit to working with communities as they experiment, learn, and try again. Second, incorporating inspiration into programs from the start is certainly possible, and practitioners should have the confidence and support to develop culturally appropriate techniques to do so. The Critical Learning Cycle Model is a framework that values inner reflection and encourages practitioners to uncover the role of inspiration in making meaning and to validate such internal processes, building individual and community capacities to envision and enact innovative change. For practitioners and scholars, including experience and inspiration will be the next challenges for sustainability education programs.

Future research should aim to describe in greater detail the ways in which experience and inspiration in learning defined as meaning-making contribute to participatory community development. This may require careful design of programs to include all elements of the Critical Learning Cycle. Research to investigate internal processes, such as inspiration, should include diverse learner contexts, such as our investigation into women learners in an Islamic culture. At present, not enough is known about the roles of familial networks, faith, or other cultural contexts and their relationships to systemic change at individual and community levels to support water sustainability, particularly in adult learning settings.

Furthermore, research should examine learning in longer-term situations, studying multiple, community-level cycles of experimentation, reflection, and program adaptation by and with learners. Too often, programs are initiated but not supported on a sustained basis, nor are they continually investigated for insights on complex learning processes. By using a process-focused framework for programming and research, sustainability education scholars commit to working with communities as they experiment, learn, and act again and again.

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