

RESEARCH ARTICLE



Community-driven informal adult environmental learning: Using theory as a lens to identify steps toward *concientización*

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ABSTRACT

This article examines community-driven adult environmental learning in a volunteer watershed stewards program. We look for evidence of elements that portray steps toward “*concientización*”—the process of individuals and communities directing their own learning in nonhierarchical ways. Leveraging two theories from the learning sciences and community development research, affinity spaces and the Asset-Based Community Development model, we trace participants’ development toward *concientización*. Data collected through interviews with watershed stewards speaks to parts of these theories that in turn signal elements of *concientización*. Our findings point to the importance of providing communities with support that is flexible and easy to use for identifying and leveraging the resources in their community. We call for a new framework to understand how to help learners access community-driven environmental learning experiences and supporting resources at opportune times.

KEYWORDS



Affinity spaces;
Asset-Based Community
Development model
(ABCD); community-driven
informal adult
environmental learning;
concientización

Introduction

Environmental education learning theories have been changing. In the 1980s, the prevailing models posited that if the general public “knew better, they would act better” (Kelsey & Dillon, 2010). These models emphasized providing the public with knowledge about the environment, assuming that if citizens were familiar with and aware of environmental issues they would be more likely to orient their behaviors toward sustainability and environmental actions (Kollmuss & Agyeman, 2002; Wals & Dillon, 2013). However, research in the past several decades has shown these models to be insufficient for capturing the depth of complexity that influences citizens’ motivations and actions with respect to the environment.

In order to more fully understand this complexity, environmental education researchers have called for interdisciplinary approaches, lenses, and theories that can shed new light on how environmental learning happens and how such learning influences learners’ actions within their communities (Wals, Brody, Dillon, & Stevenson, 2014; Wals & Dillon, 2013). For example, recent research suggests that engaging citizens in real-world community projects can increase the scope and impact of such endeavors (Castell et al., 2015; Huddart, Thompson, Woodward, & Brooks, 2016; Yang et al., 2016). Researchers have engaged citizens, for instance, in local water pollution reduction and air quality projects through providing ubiquitous data collection opportunities and inclusive data visualization that supports citizens in changing their actions based on observed data in their neighborhoods and communities (Castell et al., 2015; Huddart et al., 2016; Yang et al., 2016).

In response to this call for more interdisciplinary approaches that shed new light on how environmental learning happens, our work begins with the goal of promoting *concientización* or one’s willingness and ability to leverage deep understanding of society and their own ability to act within society to effect pro-environmental changes at local and community-wide scales (Clover, 2002; Freire, 1970). Building

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on the work of Freire (1970), Clover (2002) refers to the type of policy and macro-level understanding needed for such broad changes as environmental “*concientización*”. Situated in the context of a watershed stewards academy (WSA), we link theories from the learning sciences and community development research to *concientización*. We aim to understand how learning happens in the context of watershed stewardship and how participants leverage community resources to develop and implement community-driven watershed stewardship projects.

Sponsored by the Anacostia Watershed Society (AWS), a non-governmental organization in Maryland, the WSA under study is one of a network of stewardship programs that focus on training citizens to serve as community resources on local watershed issues. The WSA includes classes, experiential learning, and capstone projects to address aspects of stormwater management and watershed conservation. The Anacostia Watershed Society itself has a mission to protect rivers and streams that form part of the Anacostia Watershed, which covers much of the Potomac region of Maryland and the District of Columbia in the eastern United States. The emphasis in the WSA on stewards’ environmental activism and community-based projects makes the context ripe with potential for understanding the development of *concientización*.

Background

Toward environmental learning and concientización

Although modern environmental education research has moved away from “know better, act better” approaches to environmental learning, researchers agree that content knowledge is still important. To be specific, understanding the scientific phenomena behind an environmental issue (e.g. rainwater washing pollutants from parking lots, sidewalks, and lawns into local waterways) and how local policies affect the environment is critical for taking effective environmental action (Robelia & Murphy, 2012; Walter, 2009). With this understanding, residents can act to reduce negative impacts on the environment and develop more environmentally beneficial individual and collective habits (Heimlich & Ardoin, 2008).

Other environmental education models emphasize a range of factors that influence one’s environmental learning and action, including but not limited to one’s experiences, social norms, cultural traditions, family culture, altruism, and attitude changes over time (e.g. Rajecki, 1982; Eisenberg & Miller, 1987). Some research from the early 2000s in this area, for example, has investigated the types of experiences or communication that increases citizens’ altruism (Schultz, 2000). However, research has found that even when altruistic feelings increased among participants, they did not always trigger environmental action (Boyes & Stanistreet 2012; Kollmuss & Agyeman, 2002). In light of these influences and the complex ways in which they are related to participants’ motivation to take action (e.g. ways their decisions to take action are also influenced by many sociocultural and individual factors), it is important to support citizens’ critical inquiry (Stevenson & Stirling, 2010), that is, their deep reflection on the societal and individual influences on their environmental perspectives and actions.

In addition, critical inquiry includes citizens leveraging accurate information to make choices in their lives and in society to effect positive environmental outcomes (Stevenson & Dillon, 2010). Environmental education research has also pointed to the importance of democratic processes that promote and encourage the public to take action and effect change in the environment at local and systemic community-wide scales (e.g. Clover, 2002; Hamilton & Wills-Toker, 2006; Kollmuss & Agyeman, 2002). Key to such actions are practices and structures within organizations and institutions that promote community dialog, knowledge building, sharing, and action (Clark, 2010; Gough, 2013; Hamilton & Wills-Toker, 2006; Kollmuss & Agyeman, 2002). Furthermore, theories and approaches for understanding such practices are needed that welcome a broad range of cultural approaches (Falk, Storksdieck, & Dierking, 2007; Kelsey & Dillon, 2010; Kollmuss & Agyeman, 2002; Lehr et al., 2007).

To move beyond emphasizing content knowledge, Darlene Clover (2002, 2013) points to the importance of helping citizens develop *concientización*, which involves taking individual and systemic community-wide action so that the public can evaluate macro-level issues and policies that affect the environment. Whereas individual approaches may require significant changes to an individual’s

day-to-day life, these changes may produce minimal positive effect on the environment, whereas ignoring the larger issues that form the core of local, state, national, and international policy decisions can have profoundly detrimental impacts. For example, Clover (2002) describes a neighborhood movement to recycle in which, unbeknownst to the community, the city was dumping its recycling out with the regular trash to cut down on costs. Her example demonstrates that individual actions alone may not be enough to make a significant difference; individuals must work together and become aware of key policy issues to make substantial changes.

Environmental learning through the lens of *concientización* involves expanding from individual actions based on deep content understanding (e.g. planting a rain garden, consuming less energy) to systemic community-wide endeavors that stem from a deep understanding of the impact of policy and infrastructure on the environment. These actions often require a collective effort by people from diverse backgrounds (Clover, 2013). As learners develop such *concientización* practices, Clover (2013) calls for experiences that help citizens to begin to think differently about the environment. Such critical thinking might then promote *eduactivism*, or community members educating others about environmental principles and issues.

Concientización provides a high-level goal for environmental education but sheds less light on how to help learners achieve that goal. Building on environmental educators' calls for interdisciplinary approaches that can shed light on the complexity of learning and environmental activism (Wals et al., 2014; Wals & Dillon, 2013), we turn to two theories from the learning sciences and community development literature to gain a deeper understanding of learning within the context of the WSA, and for exploring the kinds of supports that might help the WSA and similar adult volunteer learning communities toward *concientización*: affinity spaces and Asset-Based Community Development (ABCD). The affinity spaces framework was identified as an appropriate theoretical framework prior to data collection, whereas ABCD was identified by the researchers during data collection and analysis.

Affinity spaces: A theory for supporting Community-Driven environmental learning among adults

Gee (2005) uses the term *affinity spaces* to describe locations in the real or virtual world in which people interact around a common passion or interest with others who have different expertise and who take on different roles sharing their knowledge, tools, and technologies. Example studies have typically included gaming communities and enthusiast clubs (e.g. Star Wars online fan groups), spaces that are usually informal learning contexts. Science-focused affinity spaces (e.g. science fiction sites, kitchen chemistry groups) offer opportunities for community members to engage in learning that is deeply connected to their interests and values, and they provide low-risk opportunities to explore potential roles participants might take in science, especially when the science is directly relevant to their own lives (Clegg et al., 2014). Stemming from game-based applications, Gee (2015) describes how affinity spaces consist of a *rich problem-solving context* and *interest-driven sites* where groups of people organize around their own interests. Our research offers a new application of Gee's research, which has been applied mostly to gaming, in which the "game" is the *rich problem-solving context* and the *interest-driven sites* are typically an online "portal" (Gee, 2015).

The affinity spaces theory is particularly well-suited for understanding learning in the WSA because the program leverages participants' interest in the health of their local waterways to facilitate the development of personal, community-based projects. In the WSA, context-rich problem solving occurs around the need to find solutions to the problems of stormwater runoff, whereas the interest-driven site is the WSA environmental learning context (Clegg et al., 2014). Like Gee (2015), we advocate that the two should be studied as a unit. Participants' experiences are integrally developed as they navigate both the interest-driven site of the WSA and the development of solutions for stormwater management. As participants' experiences develop, there is often a rich interplay of diverse ideas as community members make suggestions influenced by their own experiences.

Gee (2015) proposes three types of diversity that may facilitate sustained learning experiences for participants. First, affinity spaces should *bring together people with different orientations to and expertise in the domain of interest* while encouraging all participants to draw from the unique bodies of knowledge they bring from their respective community experiences. Second, affinity spaces need to *promote diverse*

modes of engagement, enabling individuals to take on distinct roles in groups and offering different ways of contributing and different modes of communication. Third, *distinct roles and multiple ways of contributing* support the need for diverse ways of learning and learning experiences for participants.

WSA is well situated to enable these types of diversity as participants come from a variety of professions (e.g. teachers, bartenders, plumbers, clergy, environmental workers) and have a diverse range of interests in stormwater management (i.e. *bringing together people with different orientations to and expertise in the domain of interest*). They therefore take a variety of approaches to addressing stormwater runoff in their community (e.g. community action and advocacy, education, landscaping) (i.e. *diverse modes of engagement*). Facilitators often begin the WSA classes with introductions of stewards emphasizing their disciplinary background, interests in stormwater management, their orientation to the watershed, and the diverse subcommunities they are a part of that they could leverage as they undertake their projects (e.g. where they live and work). Throughout the program stewards are encouraged to contribute and build upon their own areas of expertise to help one another, ask questions, and propose project topics (i.e. *distinct roles and multiple ways of contributing*). To apply Gee's theory of affinity spaces to our diverse WSA context we need to understand how participants' interactions along these lines of diversity relate to participants' development of *concientización*.

The Asset-Based Community Development model (ABCD): A theory for mobilizing community resources for environmental learning among adults

For any community to successfully undertake environmental learning projects, resources are needed. What kinds of resources and how many are the salient questions. Many communities tend to assume that they need skills and financial resources from outside of the community without realizing that the community itself may be a rich source of resources. The Asset-Based Community Development model (ABCD) is a community mobilization theory that enables communities to identify and draw upon their own resources (Mathie & Cunningham, 2003, 2005). By performing asset-based modeling, these resources become apparent (Kretzmann & McKnight, 1993, 1996).

The ABCD theory encourages communities to focus on the resources they already have and to leverage them rather than focusing on what they don't have, which is a deficit approach. Mathie and Cunningham (2003:478) further argue that ABCD moves away from deficit mindsets because of its ability to more strongly vest community members in community development. ABCD thereby takes the focus away from problems (deficits) and focuses on aligning action to available capital in the form of social relationships in the community. By taking an asset-based focus, AWS community members can assume more control of their own destiny by identifying impactful leaders and strategies for improvement. As well, by mobilizing the social capital that is shared in the rich context of a community, the ABCD model enables communities to achieve shared goals. Jakes, Hardison-Moody, Bowen, and Blevins (2015) has identified *three key concepts* centered around the idea that local institutions (e.g. businesses, schools), civic associations (e.g. churches, cultural groups, and clubs), and resources of individuals (e.g. income, age, skills, talents) are community assets that can be mobilized. The key concepts that drive mobilization are (1) focusing on the communities' existing resources and capacities; (2) relying on community relationships as the driving force for action; and (3) understanding and connecting these resources and relationships to build solutions (Jakes et al., 2015).

As stated earlier, the ABCD theory was identified by the researchers during data collection/analysis. It is *not* a theory that was used by the WSA educators in the development of the WSA curriculum. However, during our research we observed that as an interest-driven affinity space, the WSA has a network of people and organizational assets that support environmental learning and also speak to the potential relevance of the ABCD theory. Hence, aspects of the program design specifically encourage participants to link to resources within their cohort and community to carry out their capstone projects. Stewards are encouraged to share skills and knowledge with one another and to work together on projects if they wish. The AWS additionally makes a special effort to bring stewards into contact with other local groups (e.g. grant and rebate programs, environmental associations) that can support them both in terms of sharing local knowledge and providing small amounts of funding. The WSA program

thus provides a rich context within which to apply the ABCD model to understand the ways participants are leveraging community resources and how these efforts influence participants' *concientización*.

The conceptual framework: Tying it all together

To summarize, affinity spaces support diversity of expertise and provide the physical, virtual, or intellectual space within which the ABCD theory can be applied to leverage the community's own resources. Our focus on the affinity spaces and ABCD theories and their link to *concientización* came about somewhat inductively as we began collecting data and observing sessions. We specifically began to note the prevalence of interactions and discussions about the constraints and breadth of project topics, challenges stewards faced carrying out projects, and the importance of collaboration with other stewards and community members.

Our understanding of the affinity spaces and ABCD theories was helpful for identifying the importance of these emergent themes. For example, an interview with a former steward who did not complete his capstone project revealed ways he became disengaged in project work when stewards in his cohort were steered toward "shovel in the ground" projects (e.g. planting rain gardens, installing rain barrels) whereas he was more interested in policy-based initiatives regarding stormwater management. This excerpt demonstrated the importance of affinity space principles of diversity (i.e. of expertise, modes of engagement, and means of contributing) and making such values explicit in the program design. Subsequently, a WSA director/facilitator described how he purposefully broadened the scope of capstone projects to allow stewards to leverage their diverse interests and skills. The salience of these concepts across interviews (as data was being collected and memoed) pointed us to the potential value of the affinity spaces and ABCD theories that explicitly name these characteristics of learning environments and communities and point to their integral role in learning and community development.

Collectively these theories provide the building blocks for understanding and creating *concientización*, which includes the responsibility of both individuals and the community to reflect, trust, and promote equality in environmental learning and to take appropriate action to protect the environment (Clover, 2002). For AWS, this means mitigating the harmful effects of stormwater runoff. We thus ask the following questions to understand the influence of each of the two theories on *concientización*:

- Within the rich problem-solving context of watershed stewardship, how does community-driven environmental learning happen?
- Within the community-oriented WSA program how do WSA participants leverage community resources?

The first question draws on affinity spaces theory and the second draws on the ABCD theory. To bring these two questions together and begin to understand how these theories inform *concientización*, we examine in the discussion section of this article how the affinity spaces and Asset-Based Community Development theories can be leveraged to support understanding learners' progress with respect to *concientización*. But first we discuss our study context, the WSA, and the data that was collected and analyzed that informs this discussion.

Study context: Watershed Stewards Academy (WSA)

Stewards in the WSA participate in a 25-hour course in which they explore the Anacostia River watershed and its pollution challenges, focusing particularly on effective practices for stormwater management. They then plan capstone projects in their own communities that focus on stormwater management and community education. Capstone projects can be done individually or collaboratively, and stewards have up to a year to develop and complete their projects. Upon course and project completion, they become Master Watershed Stewards. According to a 2014 survey, those who participated in three WSAs in Maryland and the District of Columbia were predominantly female (64% female; 36% male), white (78% white; 22% non-white), highly educated (89% reported at least a college degree), and older (mean age of 51.5 and median age of 53.5) (Fisher, Yagatch, & Galli, 2015).

Methods

We take a qualitative, participant observer approach to data collection where four researchers participated in and observed WSA class sessions, as well as conducted interviews and focus groups with former and current WSA stewards. Participants in our study were stewards who attended WSA events including ongoing WSA classes as well as an event hosted by the WSA for former and current stewards. Between June 2015 and September 2015, we collected data from 14 individuals at different stages of their informal adult environmental learning. Some had just begun the watershed steward classes, others were planning or implementing their capstone projects, and others had completed their projects within the past five years and earned the title of master steward. Participants thus represented a cross-section of experience: seven in the coursework and project planning phases, six Master Stewards, and one who opted not to complete a capstone project. In terms of demographic representation, there were five African-American participants and nine Caucasian participants. Four participants were men and 10 were women, and the age distribution was roughly even, with four younger participants roughly in their 20s–30s; five middle-aged participants roughly in their 40s–50s; and five older participants 60+. See [Table 1](#) for a complete listing of participants and their demographics. Our participant sample is reflective of the AWS's efforts to engage a more diverse population of participants than in prior WSA cohorts. To this end, WSA classes were held at African-American churches and recruitment was especially targeted toward younger audiences and toward groups underrepresented in environmental sustainability efforts.

Breaking it down to the level of individual participants, there were:

- 2 African-American women under 40 years old (Barbara, Keisha)
- 1 white man under 40 years old (Freddie)
- 1 white woman under 40 years old (Kate)
- 2 African-American women between 41–59 years old (Marian, Shelia)
- 2 white women between 41–59 years old (Laurie, Charlotte)
- 1 white man between 41–59 years old (David)
- 2 white women 60+ years old (Patty, Sonia)
- 1 African-American woman 60+ years old (Reverend Newton)
- 2 white men 60+ years old (John, Ian)

Data collection methods included individual interviews, focus groups, and classroom observation of capstone proposal presentations.

To understand the learning development of participants in the WSA context, focus group and interview questions asked participants about their motivation for joining the class, thoughts about what they might do (or did) for their capstone projects, learning experiences they had (or were having) during the class and/or their projects, and what kinds of resources they needed, including how they might use (or did use) technology to help accomplish their projects. In addition, two researchers observed the capstone project proposal presentations of one WSA cohort of stewards and one researcher conducted site visits to two completed capstone projects. Observations of capstone projects were focused on understanding the plans and goals of projects, contexts they were working within (e.g. organizations they were involving), issues and challenges they were grappling with, and feedback they received from the WSA facilitator and other stewards. Similarly, observations during site visits to completed projects focused on how the scope of steward projects changed over time, what collaborations stewards were forming, and what issues and challenges stewards were running into as their project progressed. One of the researchers was also an observer participant.

Participant and data collection details are summarized in [Tables 1–5](#). The focus groups, observations, and interviews were all recorded and transcribed.

Table 1. Participant demographics table.

Pseudonym	Race	Age	Gender	Stage of WSA Process
Barbara	African-American	Under 40 years old	Female	12-week course (First month of classes)
Keisha	African-American	Under 40 years old	Female	Master steward - completed capstone
Freddie	Caucasian	Under 40 years old	Male	12-week course (First month of classes)
Kate	Caucasian	Under 40 years old	Female	Master steward—completed capstone
Marian	African-American	41–59 years old	Female	12-week course (First month of classes)
Shelia	African-American	41–59 years old	Female	Master steward—completed capstone
Laurie	Caucasian	41–59 years old	Female	12-week course (First month of classes)
David	Caucasian	41–59 years old	Male	Completed 12-week course, did not complete capstone
Patty	Caucasian	60+ years old	Female	Master Steward - completed capstone
Sonia	Caucasian	60+ years old	Female	Master Steward—completed capstone
Reverend Newton	African-American	60+ years old	Female	12-week course (First month of classes)
John	Caucasian	60+ years old	Male	12-week course (First month of classes)
Ian	Caucasian	60+ years old	Male	Master Steward—completed capstone
Charlotte	Caucasian	60+ years old	Female	Master steward—completed capstone

Table 2. Focus group protocols (6/25/15).

Participants	Protocol
6 stewards in the first month of classes: <i>Barbara: Young African-American woman</i> <i>Freddie: Young white man</i> <i>Marian: Middle-aged African-American woman</i> <i>Laurie: Middle-aged white woman</i> <i>Reverend Newton: Older African-American woman</i> <i>John: Older white man</i>	Two-hour focus group explored three main issues: (1) participants’ motivations for participating in the WSA; (2) their perceptions of, and need for, technology in their environmental work; and (3) their plans for individual capstone projects. Questions included: <ol style="list-style-type: none"> 1. Tell us about why you chose to participate in the WSA. 2. How do you currently use technology in the WSA program? What kind of apps and other tools (e.g. bird identification apps, water testing kits, microscopes, binoculars, nets, spreadsheets) do you currently use? 3. Is there any technology that you would like to use for WSA but do not have access to? 4. What are you currently planning to do for your capstone project in WSA? 5. What are your goals for your capstone project? 6. What has been the most challenging part of your project (or developing your project idea) thus far? 7. What do you think will be the most challenging part of carrying out your capstone project? In addition, a technology prototype was demonstrated and used as a probe to elicit technology-related feedback. Participants’ feedback on this prototype has been reported in other work (Boston et al., 2017; Clegg et al., 2016) and is beyond the scope of this article.

Table 3. Observation of capstone project proposals (7/30/15).

Participants	Protocol
6 stewards in the first month of classes: <i>Barbara: Young African-American woman</i> <i>Freddie: Young white man</i> <i>Marian: Middle-aged African-American woman</i> <i>Laurie: Middle-aged white woman</i> <i>Reverend Newton: Older African-American woman</i> <i>John: Older white man</i>	Individual slide presentations about proposed projects followed by question-answer period (approximately 20 minutes per participant). Presentations were expected to cover the following topics: *Project summary *Significance *Location *Description, including education and community components *Budget *Timeline *Anticipated challenges *Benefits

Table 4. Individual Interviews (8/31/15 – 9/28/15).

Participants	Protocol
2 master stewards, 1 capstone in progress, 1 opted not to complete capstone: <i>Keisha: Young African-American woman</i> <i>Laurie: Middle-aged white woman</i> <i>Patty: Older white woman</i> <i>David: Middle-aged white man</i>	The four interviews followed a semi-structured protocol and ranged from 30 to 60 minutes. Initial questions were: <ol style="list-style-type: none"> 1. Why did you decide to participate in the WSA? 2. Tell me about your capstone project. Why did you choose it? How would you describe your current stage? 3. How has participating in the WSA influenced your thinking about the watershed? 4. What is the most important thing you learned and would like to share based on your participation? 5. What technologies did you use during the classes and your project implementation? 6. What technologies might you have liked to use?

Table 5. Focus group (9/16/15).

Participants	Protocol
4 master stewards: <i>Charlotte: Older white woman</i> <i>Ian: Older white man</i> <i>Shelia: Middle-aged African-American woman</i> <i>Kate: Young white woman</i>	Two-hour focus group explored two main issues: a) personal experiences with individual capstone projects; and b) use of technology during capstones and other environmental work. Questions included: <ol style="list-style-type: none"> 1. Please tell us a little about yourself and your capstone project. 2. What challenges and successes did you encounter while doing your capstone? 3. What did you learn from the experience of completing a capstone? 4. What are some examples of your favorite technologies? 5. What technologies did you use during your capstone process? 6. What ideas do you have for additional roles technologies could play in environmental work?

Data analysis

Our analysis is deductive and inductive. Following a first round of structural coding (Saldaña, 2015), the ABCD, affinity spaces, and *concientización* theories served as *sensitizing concepts* (Bowen, 2003, 2005; Charmaz, 2003; Gilgun & Sussman, 2014) that guided a second round of coding specifically oriented toward understanding how the theories can inform our understanding and promotion of *concientización* for communities. We now describe this analysis process in detail.

Data from the focus groups, observations, and interviews were coded by researchers using Dedoose qualitative analysis software. Several structural codes (Saldaña, 2015) were applied by two researchers during the initial pass to help make sense of the data. We began with the broad codes related to participant skills/backgrounds as well as the WSA program structure, *People* and *WSA Program*. We then applied the following additional subcodes: *Recruitment*, *12–14 Week Class Experience*, *Capstone Project*, *Learning*, *Collaborations*, and *Technology* to capture more detailed specifics about the constituent elements of the WSA Program and how participants worked together to accomplish goals. During a second pass, a number of subcodes emerged inductively from the data. In relation to *Capstone Project*, these included *Ideation*, *Challenges*, *Site Selection Process*, *Capstone Implementation*, and *Outcomes and Maintenance*. Two subcodes emerged under *Learning*: *Learning Developments* and *Learning Goals*. Three types of collaborations were identified inductively under the subcode *Collaboration*: *Diverse Collaboration*, *Partnerships*, and *Steward Collaboration*. Subcodes under *People* also emerged inductively (Corbin & Strauss, 2008) and reflected the diversity of experience and background that individuals brought to the class.

Analytic memos were used throughout the coding process. Tables were applied to codes to illustrate overlapping ideas to capture the full learning experience and how participants' learning happened. In this way, we could infer the learner's experience from the data (Miles, Huberman, & Saldana, 2013). A third researcher then conducted an additional coding pass across the data to inductively develop patterns within the subcodes for learning developments, learning goals, diverse collaboration, partnerships, and steward collaboration. Next, the third coder incorporated codes guided by the affinity spaces and ABCD

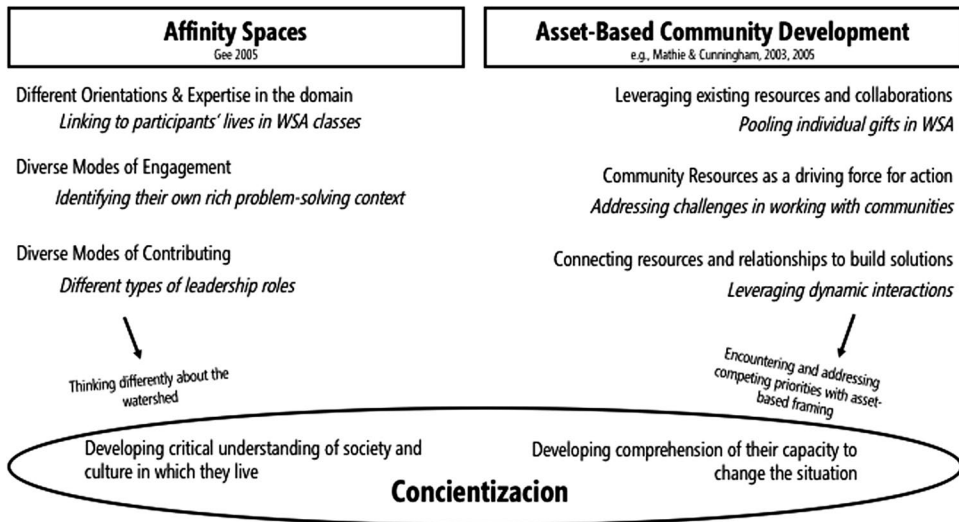


Figure 1. Leveraging affinity spaces and the ABCD model in the analysis of participants' WSA experiences helps us understand how learning develops to support the elements of concientización.

theories as sensitizing concepts (Bowen, 2003; 2005; Gilgun & Sussman, 2014) to illuminate *how* these aspects of the learning experience and participation in the WSA community influence participants' concientización. The third coder thus deductively linked the themes resulting from the previous round of coding to the concepts espoused by the affinity spaces and ABCD theories as well as concientización. (As mentioned previously, other work such as Boston et al. (2017) and Clegg, Preece, Pauw, Warrick, and Boston (2016) focuses more tightly on analyzing the technology codes.) Applying the ABCD and affinity spaces theories reflects our shift to focusing on a more theoretically driven analysis, which typically occurs with deeper levels of coding that mark the transition between initial and later coding stages (Saldaña, 2015).

Affinity Spaces Learning: Themes that related to understanding how participants' learning developed included (1) linking watershed stewardship practices and knowledge to participants' lives (i.e. rich problem context, diverse expertise), (2) identifying and implementing capstone project topics (i.e. rich problem context, modes of engagement), (3) learning and funding opportunities (i.e. interest-driven sites), and (4) taking on new leadership roles (i.e. ways the three types of diversity in Affinity spaces are observed—diverse expertise, modes of engagement, and ways of contributing).

ABCD: Themes that related to understanding how participants make use of community resources included: (1) types of resources participants leveraged and (2) diverse collaborations.

Both: Some themes related to and informed both research questions, including (1) challenges stewards face and (2) steward collaboration.

Affinity Spaces themes were then grouped according to Gee's (2005) three types of diversity and ABCD themes were grouped according to the three key concepts of the ABCD framework (see Figure 1). We now present each group of themes, with examples, in the Findings section.

Findings

Our findings are described under two themes based on the questions mentioned in the previous section: 1) how community-driven environmental learning happens (which relates to the affinity spaces theory); and 2) how WSA participants leverage community resources (which relates to the ABCD theory). We describe our findings with respect to these questions.

Q1: How does Community-Driven environmental learning happen?

Different Orientations and Experiences—Linking to participants' lives in WSA classes. During WSA classes, participants became aware of the impact of stormwater pollution on the environment. They learned how water pollution develops through stormwater runoff, and about ways to prevent runoff from carrying pollutants to the river through such practices as installing rain barrels and creating rain gardens. They also began to consider community and policy issues as they learned to assess stormwater management practices, toured green sites (e.g. a local city administration building), and interacted with their WSA facilitator and other stewards. The stewards then began to take these practices to their own homes, neighborhoods, and workplaces. For example, Ian¹ described his experience of doing site audits in the program: “It was really low tech ... we went around to houses, and that really gave you a perspective of how little people think about water issues around their home.” He went on to say that he also conducted site audits in his neighborhood: “I did a walk afterwards around my neighborhood, I was shocked to find like 80% of the houses have water draining right at their foundation, which is like the worst thing in the universe.” Another participant, Laurie, similarly described how she began to discover water management concerns at her job: “I didn’t know that half of the water in our [religious facility] is not being treated before it hits the river. And I had no idea that we are dumping about 12 million gallons of water into the river every year.”

Diverse Modes of Engagement—Identifying their own rich problem-solving contexts in capstone projects. These inquiries into their own contexts stimulated participants’ ideas for their capstone projects, and many chose projects rooted in their own interests, neighborhoods, and professions. For example, Laurie chose to focus her capstone project on the religious facility that she managed. Her project involved supplying other faith-based groups with information about stormwater management. Similarly, Freddy described how doing a project that was local to his neighborhood was important. Ian, a retiree, drew on his previous profession to develop a publicity campaign for an under-used rebate program: “Well, I come from an advertising marketing background, so I felt that was something that I could offer that I could see there was a need for.... I generally like to just take on things that, if they fit what I can do and then just do them.” Similarly, Sonia described her project of working on rain barrel installation with a student co-op in her residential neighborhood as “a collage of different interests, and in the class, I determined that the best thing was to help the students.”

As participants began to implement their projects, they reported common learning needs, as well as ones related specifically to their circumstances. Most participants discussed the need to understand effective ways to manage stormwater (e.g. rain barrels, rain gardens), how stormwater management works (e.g. how rain gardens soak up stormwater so it can be filtered in the ground rather than flow directly into the river), ways to build and implement best management practices (e.g. what types of plants to put in a rain garden, effective materials for building a rain barrel), and how to handle construction and maintenance problems when they arise. Kate, reporting on a playground project, stated, “The challenge is that, for myself, with my own removing pavement and permeable pavement, and rain gardens, rain barrels, it’s a lot to learn and that’s a challenge. I think I knew in the beginning it was a lot to learn, but you know, I’m doing it all myself, with the help of friends and neighbors, and it’s kind of fun, too, to learn this together.” Ian reported on the physical challenges of the labor: “Doing rain gardens is hard work. I have the muscles and probably a few callouses.... I’d put in gardens before, both veggie gardens and other gardens, and it was much more challenging than I expected from every viewpoint. From figuring out what to plant... How to manage each section, then how to physically do it, manually, because I didn’t have the equipment. So they’re in, but it was a heck of a lot of work, probably more than 40 hours of work.”

Diverse Modes of Contributing—Taking on different types of leadership roles. As participants carried out their projects, they reported taking on more leadership roles in their communities and changing how they viewed themselves and the local river. For example, Barbara reported that she began to educate her father about runoff principles and encouraged him to question his practices as she learned more about the topic. Keisha described how she began to see herself and the water differently as she carried out her capstone project which led to her take up of new leadership roles: “... all the energy and passion that I’ve put into this project has really changed ... Again, I was a city girl in Cincinnati, Ohio right by a huge river, the Ohio River, and all I would say when I’d go get my soccer ball and looked at it was, ‘Eww. It’s nasty.’ And

turn around and go back to my human concerns. But now it's like I look at waterways so much differently. I even got a Bay-Wise Certification and I'm trying to just do a lot of work around educating the public, whether it be through [an elementary afterschool program] or through the PTA Green School credit your kids can get for helping with green gardening and all this stuff."

Patty discussed the importance of engaging in larger scale projects for increased impact. She described her current role on an ecological task force helping a local homeowners association request transparency from local builders and knowledgeably assessing their reports. However, she observed that more help was needed for stewards to take on broader scale projects: "I think a really, really big benefit to the [WSA] program would be to connect with either the county planning boards or even the state planning boards... The productive work is all gonna go back to the goals and incentives that are set by the EPA and by the Governor. And when there's some conflicting things that are going on in [another] county. For example, there is a lot of [housing] density that is planned. There's a lot of construction, a lot of real estate development. The Governor has decided, and the congressmen from this district have decided that [housing] density is going to provide growth.... And that has big implications for stormwater. So, if people like myself, or if there are tools, if there are ways to be sure that when these big goals are set up, like okay, we're pushing for density now, that then we can be sure that the stormwater goals are actually met and that there's transparency in that big plan."

Affinity Spaces and Concientización. These findings illustrate ways the affinity spaces theory links to *concientización*, specifically through illuminating how participants enacted the three types of diversity specified in the affinity spaces theory. These enactments are then linked to a key aspect of *concientización*—participants' critical understanding of society and the culture in which they live. First, diversity of orientations to and expertise in the domain was leveraged through activities such as the site audit that gave stewards tools to explicitly link stormwater management issues and practices to their lives and interests (e.g. Barbara's links to practices at the church organization to which she belonged and worked). Second, we observed diverse modes of engagement as participants leveraged their own contexts (e.g. their churches, work places, etc.) to identify capstone projects. Broadening the scope of projects beyond "shovel-in-the-ground" projects then enabled participants to identify rich problem contexts according to their own skills, interests, and life contexts. For example, Ian's project leveraged his background in marketing to develop a publicity campaign for a rebate program.

The third type of diversity—diverse modes of contributing—was reflected in the numerous ways in which participants took on leadership roles in the WSA class. Our findings indicate potential shifts in participants' perspectives about the environment and the role they can play in enacting change. As participants took on their capstone project work extensively, some began to see themselves and the watershed differently, suggesting initial development of a critical understanding of the social culture in which they live. For example, Keisha began to see the river as a part of her environment not to be taken for granted. Recognizing the need to promote clean water efforts in her community led Keisha and Patty to take on more leadership roles and, in Patty's case, to advocate for large scoped projects.

Q2: How do WSA participants leverage community resources?

Leveraging existing resources and collaborations in the community. We found that participants leveraged their interactions with one another to provide resources for their capstone projects in several ways. First, participants leveraged AWS as a resource for their projects as AWS staff provided stewards with information and help in their project work. Furthermore, stewards drew upon their professions for their capstone projects—leveraging their jobs (i.e. local institutions) as contexts for their capstone work and using their individual resources, such as professional skills (e.g. marketing), to carry out their projects. Participants also leveraged their relationships with local institutions and civic associations (e.g. schools, churches, community groups) to provide contexts and partnerships for their projects. Shelia, an elementary teacher, described reaching out to a previous class and their family members for help with a drain stenciling project near the school: "I actually had them in second grade, I had them in third grade, and then again in fifth grade. So yeah, they're like near and dear to my heart... I know that they would just be like, 'Yeah, let's do it' and I could just call their parents and say, 'Alright, okay, let's meet here,' and I know

which parents to call that would come out with their kids and do it with me so it wouldn't be that big of a deal."

One major theme that emerged from participant collaborations was ways that participants pooled their individual resources (i.e. knowledge, experience, skills, and resources) together in their interactions with one another. Some stewards collaborated on their projects and integrated their diverse connections, skills, and experiences to advance their projects. For example, Kate, who partnered with another member of her WSA class to do a stormwater project at a school, said, *"We both wanted to do a school project, and he had a connection at the school. I had the insurance, though."* Patty described her partnership with a classmate on a rain garden in terms of their complementary skills: *"We divided the work... he documented a lot of the work, and kind of kept track of a lot of the nitty-gritty. I was sort of the tip of the spear pulling people together and I had the vision and vendors.... But he kept all the individual pieces collated and managed. ... He was the detail guy and I was sort of more of the holistic thinker."*

More often, participants naturally began to share resources as they interacted with one another informally – sharing information, insights, experiences, and opportunities to help one another on their projects and to spark new project ideas. Sometimes the sharing was tangible, for example, sharing stencils and paints for drain stencil projects, or plants for gardens. Stewards reported that they wanted help finding other stewards with similar interests and diverse experiences and resources. They also discussed their interest in forming larger project groups to do "mega projects."

Community relationships as a driving force for action—Addressing challenges. Whereas stewards leveraged the AWS and one another as community resources, they also emphasized challenges with such in-depth community work. As they carried out their projects, stewards reported challenges involving understanding community practices, culture, and the people they were working with on their projects. Some challenges that learners faced included working with large communities, developing connections with the community, and motivating community members to take continued action that included facilitating upkeep of the stewards' projects after they were completed. For example, the rain garden Keisha installed at a school was unwittingly mowed over by a maintenance staff member in the summer, prompting her to note, *"It's not so much getting the final project done for a lot of these cases... Although sometimes that can be the problem. But it's the long-term, especially if it's a landscaping. The long-term follow-up ownership by the community... The deep identity-changing education that is challenging."*

Participants also reported challenges with the transience of community leadership and organization. Often, after developing relationships and getting buy-in from one community organization or group, the leadership or organizational structure changed. Kate, for example, working on a school-based project, reported, *"The first teacher that we connected with at the school, she has since moved away... and the other teachers that we first worked with are no longer there. The administration has turned over so it's like, like, I feel like I'm starting fresh this year, with this school, but they still seemed really interested."*

In addition, stewards discussed the importance of understanding the competing priorities of community members. For example, some stewards talked about how keeping costs down would be a bigger priority for home developers than properly managing the stormwater runoff. To address these issues, stewards often tried to make connections between stormwater management and the community's values and goals (e.g. connecting stormwater management to the organization's or leaders' mission statement). Other kinds of challenges included needing to invest significant time and energy to complete projects; obtaining grants and funding for their work; and accessing appropriate tools for conducting site audits and recording other data.

Connecting resources and relationships to build solutions—Leveraging dynamic interactions. An interesting theme that emerged from the data was the stewards' dynamic interactions with each other even when that was not the intent of the session. In these sessions, participants often naturally flowed into conversations in which they offered resources (e.g. learning materials, contact information) to one another; discussed ways to address challenges they were having; leveraged their own culture, expertise, and past experiences (i.e. individual resources) to help other stewards; and asked questions about one another's projects and experiences out of curiosity. For example, a participant-observer noted that *"when Barbara and Marian learned that John has no connection to a church he hoped to contact regarding land use issues, they both took to their phones and looked at the church website to see how the church was organized and suggested a point of contact for John. They also tactfully implied that an older white man should*

proceed delicately with such discussions in a largely African-American church with which he had no connections—providing needed housing services to their congregants might seem more important than the loss of a few trees to them.”

ABCD and Concientización. Although the ABCD theory was introduced by the researchers to understand the community’s learning (i.e. it was not used in the design of the WSA program), we observed that the principles were indeed promoted and leveraged for carrying out capstone projects. Specifically, participants aligned their actions to resources available in their community through drawing upon their own personal networks in the community (e.g. their jobs, community organizations) and their own skills, backgrounds, and experience. They leveraged existing assets through pooling these individual resources together with other stewards in collaborative projects and less formally through impromptu conversations that arose during sessions. As they carried out their projects, stewards encountered various challenges (e.g. connecting with the community, transience, coordination of projects with community grounds keepers, significant labor efforts required). These challenges were often what initiated dynamic conversations and collaborative projects in which stewards integrated their individual resources. They then integrated the skills and resources of one another through project work where individuals’ community connections, expertise and experience with relevant environmental practices/projects were integrated with others to develop solutions.

As participants began to collaboratively address these problems, they had rich reflections on how they could work together to address the complex challenges of community work. Our findings suggest that they developed nuanced understandings of their own capacity to take action and make changes in their community—a key aspect of *concientización*.

Discussion: Leveraging affinity spaces and ABCD theories to support *concientización*

As stewards learned about the importance of stormwater management and developed tools for investigating and acting within their own local contexts, they began to progress from individual action and awareness to broader community action and leadership. Some continued to develop in the manner Clover (2002) advocates after their capstone projects ended, seeking to scale up their efforts beyond the level directly supported by the WSA. Our analysis reveals stewards’ progression from first developing awareness and understanding of stormwater issues during the classes, then becoming passionate about stormwater management as a result of their capstone projects, with some ultimately becoming community leaders through their continued efforts. This progression suggests that community-driven environmental projects are a context in which learners can begin to develop *concientización* (Clover, 2002, 2013). Figure 1 shows a mapping of how our analysis suggests the affinity spaces and ABCD theories support the two elements of *concientización*.

In helping learners develop a critical understanding of society and culture in which they live (Clover, 2002, 2013, Stevenson & Dillon, 2010), we found that *leveraging a rich problem-solving context* based on the affinity spaces theory (Gee, 2015) helped participants to not only develop knowledge to take action, but also to begin to think differently about the watershed, as *concientización* calls for (Clover, 2002). Participants *saw the specific needs in their community* for stormwater management practices and they began to address them, not only through taking action in their community, but also through edu-activism—leading efforts to help others learn about stormwater management practices. Key to this development were *relevant learning opportunities situated in the community that learners could further explore in their own contexts* (e.g. backyards, neighborhoods, local organizations, jobs) and WSA participants with varying professional and community experiences.

Further, *concientización* emphasizes supporting participants’ comprehension of their capacity to change the situation (Clover, 2002, 2013; Kollmuss & Agyeman, 2002). We found that participants explored the resources present in their own communities and reached out to local organizations as the ABCD theory suggests (Mathie & Cunningham, 2003, 2005; Kretzmann & McKnight, 1993, 1996). As they did so, they encountered competing priorities within their communities. Taking an asset-based stance, participants did not view themselves at odds with these organizations/people. Instead, *they worked to find common ground with their stormwater management-oriented goals and the community organization’s*

goals. This negotiation helped participants to think critically about policies, norms, and approaches for enacting stormwater management practices. Key to this development were *opportunities to interact with other community members—both those interested and engaged in stormwater management practices and those holding significant resources and positions in the community*.

Concientización establishes the goal we are reaching for with respect to learning through community driven environmental projects. However, as stated earlier, it sheds less light on *how* to promote this type of critical inquiry. Integrating the affinity spaces and ABCD theories provides guidance on ways to promote different aspects of *concientización* from different angles.

Affinity Spaces theory suggests ways to scope *projects and learning experiences* to support participants' engagement among a diversity of skills, expertise, experience, and modes of contributing. Specifically, we found the importance of broadening the scope of projects to allow for a diversity of participation, interests, and orientations to environmental projects. This transition enabled participants to take on projects related to such topics as policy, marketing, and education as well as gardening. Such diverse projects required a range of skills and orientations to environmental work (e.g. developing marketing resources requires a vastly different skillset from installing a rain barrel or stenciling storm drains with children). We also found that participants need support for a diversity of ways in which they might begin to take leadership in their communities—whether it be leadership within their own personal networks (e.g. their workplaces, families) or leading larger initiatives in the environmental context (e.g. leading or organizing mega projects in the WSA community). Our findings indicate support, resources and guidance for both types of leadership is important (e.g. informational references to distribute to personal networks as well as activities and projects for larger audiences like churches or schools).

The *ABCD* theory, on the other hand, suggests ways to support *collaboration* through social capital and mapping community assets. Our findings point to the need for more specific/explicit scaffolds for mapping and pooling individual resources and for providing more consistent ways for stewards to meet and interact as they carry out their diverse capstone projects. Since project work can be intense and time consuming, such communication modes must be lightweight and practical for stewards (e.g. virtual spaces might be considered) while also compelling (e.g. participants must recognize the benefit of such meetings for their project work). Our findings suggest these resources should also help draw out goals of each individual contributor or organization and help collaborators find common ground.

Taken together both theories emphasize critical aspects of *concientización* including engaging community members from a variety of backgrounds, with a diverse array of skills, expertise, and relationships to the environment as well as a variety of “channels” for interaction regarding projects. As these two theories are integrated, we begin to see the potential for critical inquiry processes that lead to *concientización*. What then becomes apparent is the need to support critical approaches and helping participants navigate complex community issues at the core of making change and coping with the demands of community projects. For example, Barbara and Marion's interaction with John (regarding approaching African-American churches for partnerships) points to the complex role of social class, race, and competing priorities in effecting community change and the ways that diverse community members' interactions and collaborations can help support effective efforts to make that change. Our findings also suggest the potential of repositories for environmental learning communities to pool resources/artifacts (e.g. information, important tips/processes, maps, etc.) to support stewards as they encounter challenges in project and community work.

Our analysis shows that as Clover suggested in other contexts, WSA community members face significant challenges with respect to learning and engaging in stormwater management practices as well as reaching their broader community to promote good stormwater management practices and learning (Clover, 2002, 2013). These findings point to the potential for *developing a new framework that emphasizes prompting, supporting, and sustaining community-driven environmental experiences*. Such a framework would build on and extend those offered by environmental education researchers (e.g. Clover, 2002; Stevenson & Dillon, 2010) as it must emphasize helping learners find the right learning experiences and resources (e.g. funding sources, lectures, hands-on experiences) in their community at opportune times to support and empower them in their own local and larger-scale contexts. This framework must balance

the structure needed to promote learning with freedom for learners to direct their learning and actions in their own ways so that they develop their own personal value for the environmental contexts they are working within on their paths to *concientización*. In line with the ABCD model, our findings also suggest learners' need *support for identifying and leveraging the resources (e.g. individual resources, community associations, and local institutions) in their community*.

Conclusions and implications

Environmental educators have advocated strongly for empowering citizens to understand the complexity of environmental issues and connect those issues to their own lives and values. It is then the goal that citizens would engage in environmentally sustaining practices that resonate with their own cultures and values. Specifically, researchers have called for helping citizens develop critical inquiry skills (Stevenson & Dillon, 2010) and for the development of democratic practices and processes (e.g. Clover, 2002; Hamilton & Wills-Toker, 2006; Kollmuss & Agyeman, 2002). Although researchers have been diligently developing philosophies and insights regarding how to reach this goal (e.g. Clark, 2010; Hamilton & Wills-Toker, 2006), interdisciplinary approaches and efforts are also needed to support the type of learning and development needed to address the complex environmental challenges in our society today (Wals et al., 2014; Wals & Dillon, 2013).

Within this context, our analysis of the watershed stewards academy program leverages theories from the learning sciences and community development to illuminate the need for supporting *community-driven environmental projects* in which community members bring to bear their own interests, skills, and backgrounds to carry out projects that they develop. In such dynamic learning experiences, our research reveals the need to support participants' learning of concepts, skills, and practices needed to address these environmental challenges as their projects develop as well as the development of community connections necessary to carry out meaningful and effective projects. Our analysis points to ways to support such dynamic learning experiences. Furthermore, our work contributes to a growing body of analyses (e.g. Clark, 2010; Olvitt, 2013) that focus on "within-community dynamics" in the context of environmental education experiences.

Our work specifically offers the building blocks for a framework that links community interactions to learning and learning needs. The modes of diversity put forward by the affinity spaces theory suggests a lens for supporting and understanding critical inquiry development as learners link their own backgrounds, perspectives, and culture to address environmental issues. For example, in the WSA context, the Affinity Spaces framework points to the importance of expanding capstone projects to include a broad range of projects from "shovel-in-the-ground" raingarden installations to community education projects as well as marketing projects to promote awareness. Our analysis then points to the types of supports needed for such a broad range of projects and participants. In similar fashion, the ABCD theory suggests a lens for understanding how community members understand and leverage their capacity to act within their communities, establishing their own inclusionary processes for enacting change in their community. Our work specifically points to the types of supports for collaboration that are needed to promote such community-capacity building. Together, the affinity spaces and ABCD theories help us to identify how the watershed stewards' practices and interactions gradually led toward stronger *concientización* and provide a useful lens for understanding community-based environmental projects. Future work will continue to investigate how *concientización* happens within the AWS and other environmental learning communities.

Note

1. The names and identifying details of participants have been changed for privacy purposes.

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