

ACTIVISTS, LEARNING AND RELATING TO THE CONTROVERSIAL  
TECHNOLOGY OF HYDRAULIC FRACTURING

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ACTIVISTS, LEARNING AND RELATING TO THE CONTROVERSIAL  
TECHNOLOGY OF HYDRAULIC FRACTURING

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This dissertation investigates communication dimensions of how people learn science, looking at the particular context of how activists learn science related to their political concerns. I followed two activist groups opposed to the use of hydraulic fracturing (“fracking”), the Green Squad and the Nature Protectors, for varying periods of time to understand how they learn and their relationship to science.

I found three main themes during my investigation. First, both groups seem to have developed a Transactive Memory System (TMS) and Collective Minds (CM) to divide and conquer learning about hydraulic fracturing and other issues. One or two individuals in the groups take charge of learning the scientific or technical details. These individuals often have had education and/or experience with science and/or technology. In this way, the groups are showing a “collective” science literacy. Second, most members in the group, except for a few, adopt a deficit model of communication wherein they intend to mobilize individuals through education. They worked on relationship-building or engaging in dialogue with those who were already on-board, but were reluctant to extend that effort towards those on the fence or those completely opposed. Some activists wanted to engage in dialogue with those on the fence or the opposing side, but their voices or opinions were in the minority. Third, each member or activist established their own set criteria to assess credibility of information; thus their individual learning was shaped by individual criteria. Their

assessments of credibility seemed to connect with the roles they played in the Transactive Memory System of their group.

The study concludes with limitations of the current work and future directions for this area of research.

## BIOGRAPHICAL SKETCH

Meghnaa Tallapragada was born in Hyderabad, Telangana (previously part of Andhra Pradesh), India in 1986. She attended St. Ann's High School, Tarnaka from 1990 to 2002, where she was elected school captain. She then graduated from Little Flower Junior College in 2004 with a focus in Mathematics, Physics, and Chemistry. In 2008, she graduated from Chaitanya Bharathi Institute of Technology affiliated to Osmania University with a B.E. degree in Electrical and Electronics Engineering. During the course of her undergraduate degree, she was selected to serve as a recruitment coordinator. Although she had a job offer, she chose to pursue higher education. She attended North Carolina State University and earned her first M.S degree in Communication in 2010. She then attended Cornell University where she earned her second M.S degree in Communication in 2014. She served as a graduate student representative in the Department of Communication for two consecutive years. Along with research, Meghnaa became passionate about teaching and served as a a Fellow at the Center for Teaching Excellence at Cornell University for two consecutive years. Meghnaa also has a second degree black belt and national medals in Okinawa karate, and is also a kickboxer with an Indian national level gold medal. She is also trained as a Latin dancer.

Starting September 2016, Meghnaa Tallapragada will be a Vartan Gregorian Postdoctoral Fellow at the Annenberg Public Policy Center, University of Pennsylvania.

## DEDICATION

To my family and friends who have unconditionally loved and supported me through the good and tough times of my life.

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My love for research is closely tied to my love for teaching. Every time I teach, I get motivated to produce research. Every time I read or produce research, I become excited to share that with my students. This love for teaching began with being given an opportunity to teach Oral Communication under the leadership and inspiration of Dr. Kathy Berggren. I am so grateful for having met her and studied from her. I miss her dearly, but feel her inspiring presence many times.

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## PREFACE

Learning: my one constant desire, inspiration, and love

“Live as if you were to die tomorrow. Learn as if you were to live forever.”

— Mahatma Gandhi

“The more I read, the more I acquire, the more certain I am that I know nothing.”

— Voltaire

“Study hard what interests you the most in the most undisciplined, irreverent and original manner possible.”

— Richard Feynman

“Bad times have a scientific value. These are occasions a good learner would not miss.”

— Ralph Waldo Emerson

It was not love at first sight. I was not born with a love for learning, but with time I fell *truly, madly, deeply* in love with it. When I decided to start working on my dissertation, I remember telling myself to choose a question that I was and could see myself being passionate about for a long time. I knew I would have to live with it for at least a year, or more. I wanted something that would motivate me, inspire me, challenge me, maybe even tire me, but never bore me.

I set out on my journey to find my research question. I have always been excited about controversial sciences and technologies, and wondered about how much science and technology people need to know with respect to controversies. Hydraulic fracturing was one of the more discussed controversial science and technology during 2014 in Ithaca, New York. The controversy has been alive way before I began to take

note of it in 2014. I spoke to some individuals, some who had a lot to say and others not so much. Among the ones who had a lot to say, a common characteristic emerged. They belonged to an activist or community organization. Yet, some were hesitant about even calling themselves activists. I thought this in itself would make for an interesting research study, but something else struck me as being even more fascinating. These individuals all had so much to say about the science, economics, financial, and social factors of hydraulic fracturing. Given my love for learning, it was not a surprise that I landed on the question: how do these activists learn about hydraulic fracturing? Eventually, with time it extended into also investigating their relationship to science and technology.

This dissertation describes my experience, theoretical interests, and research findings. In chapter 1, “Introduction, My Rationale,” I place my question into the existing literature, provide reasons for choosing hydraulic fracturing as a study site, and discuss my chosen method of ethnography. In chapter 2, “In Communities,” I describe gaining access to my community groups, data collection, and data analysis procedures for this study. Chapters 3-5, “Transactive Memory & Collective Mind,” “Deficit-Dialogue Models of Communication,” and “Assessing Credibility,” presents my data organized by the three main theoretical perspectives that emerged from the study. A final chapter, “Conclusions” presents my conclusions.

Through this dissertation I present my study, in my voice. You will find that my voice lacks what Becker (1986) calls an “academic flourish.” When Becker asked one of his students to remove “redundancy and academic flourish,” she presented a case for why graduate students feel the need to use such language. She said,

“While I personally find scholarly writing boring and prefer to spend my time reading novels, academic elitism is a part of every graduate student’s socialization. I mean that academic writing is not English but is written in a shorthand that only members of the profession can decipher....I think it is a way to maintain group boundaries of elitism....Ideas are supposed to be written in such a fashion that they are difficult for untrained people to understand. This is scholarly writing. And if you want to be a scholar, you need to learn to reproduce this way of writing. (Ely et al., 2001, p. 168).”

Along with Becker (1986), I too would like to disagree with his student. I would like to use my voice to connect with my readers and not distance them. Being a student of science communication, I believe in using my voice to convey my ideas in a simple, clear, and more direct manner, because science is for everyone.

## CHAPTER 1

### INTRODUCTION, MY RATIONALE

In this chapter, I introduce my study by putting forth a rationale for conducting this research. There are three sections in this chapter. In the first section, I present a theoretical review of relevant research that exposes an underexplored area of research. In the second section, I make a case for why this area of research would be appropriate to study in the context of the controversial technology of hydraulic fracturing. In the third section, I present reasons for choosing an ethnographic approach to conducting this research.

#### *Theoretical Rationale*

As mentioned in the abstract, this study investigates communication dimensions of how people learn science, looking at the particular context of how activists learn science related to their political concerns. Three strands of literature provide the theoretical rationale for this study. First, the literature discussing levels of involvement and influence of public (including activists) participation in science<sup>1</sup> provides an understanding of how boundaries of science are potentially being revisited. Second, the section on mobilization draws on the more established social movement literature to present for activist communities the connection between mobilization and learning. Finally, the discussion on social movement learning combines social movement literature with education research to present the research question for this study: How do activists learn and relate to the controversial technology of hydraulic fracturing?

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<sup>1</sup> In this study, I am not drawing a distinction between science and technology; for convenience-sake I club them together under the term “science” or “technology.”

**(Infiltrating the) Boundaries of science.** Scientists have developed boundaries to demarcate themselves from “non-scientists” or “pseudoscientists” in order to maintain their intellectual authority during decision-making (Gieryn, 1983). While the boundaries are not completely eliminated, today they are being challenged and lay individuals are being included in the scientific process. For the purpose of this discussion, I will organize the range of lay involvement into four types.

The first type involves instances where lay individuals are being considered to provide input during decision-making stages. Wynne’s study (1989) of the Cumbrian sheep farmers helped bring to the forefront the need to consider lay knowledge in decision-making. Decisions today, especially controversial scientific ones, are now being made in consultation with the scientific experts and the lay individuals (for example, the decision to hold off on introducing genetically modified (GM) foods in India in 2010 was said to be made in consultation with the Indian scientists and farmers; similarly the GM labeling decisions in the United States were made in consultation with American consumers and scientists). This type of involvement acknowledges lay experience and knowledge and is often taken in juxtaposition to the scientific findings.

The second type of involvement involves lay individuals’ knowledge and opinions are being considered during early to mid R&D phases of scientific and technological research. This approach is being studied and implemented more recently with research involving emerging technologies (Fisher, 2007; Schaubiers, 2011).

The third type of involvement is where lay individuals are invited by scientific communities to become part of the research process, often by collecting data and/or running some preliminary analysis (the Community Science Institute in Ithaca:

<http://www.communityscience.org> and the Community Collaborative Rain, Hail, and Snow Network in Colorado: <http://www.cocorahs.org> are some examples). This level of involvement can be driven by different goals: to collect more data than a small scientific team can collect, to foster an interest in science among participants, and to establish a sense of community among participants (Bonney et al., 2014).

The fourth type of involvement is often greeted with some skepticism among the scientific community. At this level, lay individuals take research into their own hands and/or conduct studies that often challenge studies controlled by the mainstream the scientific community (Brown, 1993; Ottinger 2009, 2010a, 2010b, 2013). They also become well versed in scientific terminology (Iles, 2004). Many of them are considered to be activists.

In comparing the first and fourth types of involvement it is evident that the farmers in Wynne's study were not vocal about their want/need to participate in the discussion for various reasons, whereas the community members in Ottinger's study were motivated and eager to take research into their own hands i.e., they were inspired to take collective action. In other words, there might be many individuals who are dissatisfied with a scientific issue, but some become motivated to take collective action as a community or an organization to strive for change. The focus of this study is on those individuals, who form activist communities to become more closely engaged with the controversial scientific issue.

Many scholars have characterized activists. According to Dalton (2006), "activism is no longer a matter of going to the pub to a meeting or joining friends or neighbors for a march or demonstration; it increasingly requires Internet skills, ability to form coalitions with like-minded groups, and the courage to get up in public (either virtually or offline) to speak one's mind" (p. 74). According to Grunig (1992), "an activist public is a group of two or more individuals who

organize in order to influence another public or publics through action that may include education, compromise, persuasion, pressure tactics, or force” (p. 504). According to Kim (2002), activists are individuals who come together when there is a problematic situation that arises in their communities. Diani (1992) defined activism as “a network of informal interactions between a plurality of individuals, groups and/or organizations, engaged in political or cultural conflicts, on the basis of shared collective identities” (p.1). Mintzberg (1983) defined activists as those individuals who were passionate about a special interest and were representative of public interest which was not adequately represented at governmental organizations. Browne (1998) also defined activists as interest groups who consisted of individuals working towards their common interests or concerns. According to Wright (1996) and Burstein (1998), activists were individuals who were brought together due to social, economic, or political concerns or interests, situating themselves as being separate from an organization, using their resources to influence decisions within organizations. Kim and Sriramesh (2009) synthesized these definitions to define activists as groups of individuals, who become a group voluntarily due to common interests, gain a collective identity to gather resources in order to influence decision-making. This definition takes into account the various factors described earlier, and will be used for the purpose of this study. It is clear, from all these definitions, that activist groups are formed with a reason and a desire to influence decision-making, and they are quite motivated to do so.

**Mobilization.** Social movement theorists have dedicated a substantial amount of their scholarship to studying motivations for collective action (McAdam, Tarrow & Tilly, 2001). Initially, scholars attributed motivations for a social movement through collective action or mobilization to the desire to reduce shared grievances (Gurr, 1970; Smelser, 1963; Turner & Killian, 1972; as cited in McCarthy & Zald, 1977).

But the theory of resource mobilization proposed by McCarthy and Zald (1977) offered a different perspective, wherein mobilization was driven by the availability of resources such as money, labor, and facilities. In other words, McCarthy and Zald said individuals with shared grievances couldn't gather momentum towards collective action unless they had the availability or support of resources. This view presented social movement activity as an organized effort comprising of "normal" and not "irrational" behavior coming from participants experiencing certain circumstances or life experiences (McCarthy & Zald, 1977). While the scholars made a significant contribution to the notion of mobilization as an organizing activity and brought attention to the need for resources in mobilization, their disinterest in grievances sparked criticism among scholars. McCarthy and Zald (2002) eventually recognized that while resources were an attribute for social movement organizations (SMOs) to survive, grievances were also a factor that should not be ignored.

According to Snow, Rochford, Worden and Benford (1986), it is more than the mere presence or absence of grievances, but the "manner in which grievances are interpreted and the generation and diffusion of interpretations" that is significant for effective mobilization (p. 466). They discuss the importance in having "frame alignment" between the "individual and SMO interpretive orientations, such that some set of individual interests, values, and beliefs and SMO activities, goals, and ideology are congruent and complementary" (Snow et al., 1986, p. 464). Simply put, the framing of the grievances is (also) chief, and cannot be ignored, to ensure mobilization of individuals towards engaging in collective action.

Celebrating the "25+ years" of this seminal article on frame alignment, Snow, Benford, McCammon, Hewitt, and Fitzgerald (2014) recently published an article discussing the "*Emergence, Development, and Future of the Framing Perspectives.*" In this article, they state:

The guiding message of this line of research is that framing is a verb—it is something that actors (i.e., people) do. As discussed earlier, the development of this perspective is rooted in symbolic interactionist understandings of the process of meaning construction and the ways in which people make sense of their world. When someone attends a protest, when they argue with other activists or with counterprotesters or even family members, and when they follow issue-specific blogs, they are engaged in a process of meaning construction—an ongoing, ever-changing and dynamic process. There is a case to be made that frame analysts should not lose sight of this guiding assumption and that research should focus on the microlevel processes whereby individuals create meaning through social interaction (p. 38).

A notion that conceptualizes this dynamic process of meaning-making through social interaction is learning. Learning as a mobilizing factor in social movements has been an underexplored area of research.

**Social movement learning.** Eyerman and Jamison (1991) and Foley (1999) are amongst the few scholars to initiate research into the role of learning in social movements. The field is an attempt to bring together literatures of social movement and education (Chovonec et al., 2008).

Scholars in this new field have proceeded thus far in predominantly two directions. One way this field has progressed is through the works of Paulo Freire, who saw traditional education as being oppressive and instead articulated a more liberating conceptualization of education as a mutual process of exchange between “uncompleted beings,” who are conscious of their incompleteness and engaged in a dynamic process of meaning-making (Freire, 1970; Freire, Ramos, Macedo, 2005). Studies based on his critical perspective often challenge traditional

education and investigate modes of emancipatory education in historical and current social movements (Chovonec et al., 2008; Hall, Clover, Crowther & Scandrett, 2012).

The second way in which the field has developed is through providing activism-engaged learning experiences to education in traditional classroom settings (Roth, 2009a, 2009b, 2010). While the first line of research can be said to operate in the critical tradition of education, the second is situated more along the lines of a social constructivist approach (Anderson, 2007). Lev Vygotsky (1987) introduced the social constructivist approach to learning, which presented learning as a process, which involved interactions on the social plane with peers along with interactions with oneself i.e., an aspect of internalization. In other words, for Vygotsky, learning happened through participation in activities and in dialogue with others in a group and with oneself. While the critical perspective has been applied to SMOs outside of traditional classroom settings, the social constructivist approach has rarely ventured into settings outside of traditional classrooms in social movement learning literature.

**Underexplored area of research.** Overall, it is evident that lay individuals and community members, collectively, become knowledgeable, and that there is a process which involves learning about the issue. But there is not much research that elaborates on this learning process, especially for activists. As Vygotsky pointed out, learning happens through participation in activities and in dialogue with others in a group and with oneself. For this reason, I targeted community groups focused on scientifically controversial issues.

### ***Context Rationale***

As a context, I chose the controversial technology of hydraulic fracturing. Arie Rip (1986) said that we could never get rid off scientific controversies, so we might as well learn from them. Being a student of science communication, I have been fascinated by the tremendous

learning, which takes place especially during scientific controversies (Epstein, 1996; Iles, 2004; Ottinger, 2009, 2010a, 2010b, 2011a, 2011b, 2013).

The learning was also something that stood out as an interesting finding in my preliminary investigation, which was conducted with local community members who claimed to be actively engaged in the scientifically controversial debate about hydraulic fracturing in New York State. The participants displayed a remarkable level of engagement with the scientific debate not only on the technical aspects, but also on the economic, social, and political aspects of the technology. While the preliminary investigation did not provide findings that were generalizable, they did spark my interest to explore further.

Hydraulic fracturing has been a controversial technology from around 2005. While the controversy is not contained in the United States and has become a global issue with over 200 communities across 20 countries raising concern over the implementation and regulation of this technology (Ruffalo & Hauter, 2013), the United States seems to have a relatively higher stake in the controversy.

There are about 4 million oil and gas wells in the United States, where at least 2 million have been hydraulically fractured over the last 50 years, with 95% of the new wells also being hydraulically fractured, producing 43% of the total US oil production and 67% of US natural gas production (US Department of Energy, 2013). More importantly, with hydraulic fracturing, the United States can potentially become the world's largest oil producer by 2017 (Mackey, 2012).

While some believe hydraulic fracturing is a technology that has the capacity to promote the economic standard of the country, produce cleaner energy through natural gas, save water in the long run, and also aid in increasing employment opportunities for many Americans (Jones, 2011; Walsh, 2013a, Walsh, 2013b), there are others who question its impact on drinking water,

earthquake causing slippages, methane leaks, and who also wonder about the health and environmental risks of investing anymore than we already have in fossil fuels (Lovett, 2013; Tollefson, 2012, 2013). Both sides of the controversy have been receiving ample media, public, and research attention.

Despite the wide coverage, there is a substantial percentage of Americans who are either uninformed or undecided about supporting the technology (Pew, 2012). Individuals residing in states with existing and proposed hydraulically fractured wells seem to be more familiar and polarized about the issue. For example, 48% of Pennsylvania residents and 59% of Ohio residents reported having followed the issue (Quinnipiac University, 2012a; Rabbe & Borick, 2011), and 80% in upstate New York (NY), 43% in New York City, and 59% in suburban NY indicated having read or heard about hydraulic fracturing of the Marcellus Shale (Quinnipiac University, 2012b). Among Ohio residents, 72% were opposed and 23% were in favor, whereas among NY residents, 44 % were opposed and 43% were in favor of hydraulic fracturing (Quinnipiac University, 2012a, 2012b). This suggests that the public opinion is quite split in New York.

Multiple local and national organizations have developed that either support or criticize this technology and have proven to be quite powerful in influencing decision-making. For example, on June 4, 2014, New York State's highest court ruled that towns in New York could now decide to either allow or refuse hydraulic fracturing in their neighborhoods (Dolmetsch, 2014). This decision implied that even if NY Governor Andrew Cuomo lifted an existing state-wide ban, on hydraulic fracturing, local communities could still enforce a ban on hydraulic fracturing in their area (Sadasivan, 2014). Subsequently, on December 17, 2014, Governor Cuomo announced his decision to ban hydraulic fracturing in New York state (Kaplan, 2014).

While for many this suggested an end to this almost decade-old debate, for many of the local communities it was far from over. The anti-fracturing groups remain vigilant in now trying to ban any infrastructure that supports the oil and gas industry. For many anti-fracturing groups, the controversy is not over (Smith, 2016).

Based on the literature review described above, I formulated the following research question for this study: how do activists learn and relate to the controversial technology of hydraulic fracturing?

### ***Methodology Rationale***

I chose to study the research question presented above by conducting an ethnography where I embedded myself into activist groups. As Clifford Geertz (1973) mentioned, ethnography is much more than rapport, transcribing, field notes, and research diaries. For him, what defines ethnography is not these procedures, but it is about the “thick description” described by Gilbert Ryle (Geertz, 1973). Geertz (1973) interprets Ryle’s notion of “thick description” to be interpretations or “constructions of people’s constructions” of ideas, rituals, and behaviors within a culture. He elaborates further that these constructions are embedded in situations or backgrounds, and again those thick descriptions allow ethnographers to take in the full picture. Overall, ethnography to him is thick description which involves an analysis of the observations made that meet, entangle, or diverge from one another that explain certain aspects of the culture being studied.

Maanen (2011) describes three types of ethnographies: realist tales, confessional tales, and impressionist tales. He uses the word “tales” to emphasize the inherent narrative structure to ethnographic works. Realist tales are “direct, matter-of-fact” and are often not concerned with how the fieldworker produced such results. Confessional tales are focused more on the

fieldworker experience than the observed group itself. Impressionist tales are works that carry both wherein the field and the fieldworker's experiences are given their due during analysis. Maanen draws on the impressionist movement in art, where painters like Renoir, Van Gogh, Seuret, or Monet moved away from depicting the idealist view and moved in to portraying realistic images at the time. The impressionist movement, according to Maanen, was marked by the ability of these painters to combine their self conscious impression of their surroundings by using color, light, and other techniques. As Maanen describes, for ethnographers, "their materials are words, metaphors, phrasings, imagery, and most critically, the expansive recall of fieldwork experience. When these are put together and told in the first person as a tightly focused, vibrant, exact, but necessarily imaginative rendering of fieldwork, an impressionist tale of the field results" (p. 102). I aspire for my work in the following chapters to fit the description of an impressionist ethnography. I see value in choosing to do an impressionist ethnography as it takes into account both the realist and confessional aspects of research. By presenting research that focus on both the field and fieldworker experiences, the study renders itself more access to assessing validity and also presents opportunities to replicate similar research in the future. In other words, impressionist ethnographies allow readers to measure validity of research along with presenting opportunities for replicability of research.

As described in the research question stated in the previous section, I am interested in understanding how activists learn and relate to science. In order to answer this question, it seemed appropriate to engage in an ethnographic study as described by Geertz (1973) and Maanen (2011). One of the reasons was the need to immerse myself in the activists' culture to understand how context, background, or actions are a part of their learning or relating to science and technology. As Hammersley and Atkinson (2007) describe:

“Any account of human behavior requires that we understand the social meanings that inform it. People interpret stimuli in terms of such meanings, they do not respond merely to the physical environment. Such understanding requires that we learn the culture of those we are studying. This cannot be done by following standardized procedures; it is a natural process analogous to the experience of any stranger learning the culture of a group. The task becomes cultural description; anything more is rejected as imposing the researcher’s own arbitrary and simplistic categories on a complex reality. The centrality of meaning also has the consequence that people’s behavior can only be understood in context. For this reason ‘natural’ settings must be investigated” (p. 9).

Additionally, as Schutz (1964) mentions, someone who is new to the existing culture is able to make better observations of the assumptions, beliefs, norms, or behaviors that often become tacit to its members (Hammersley & Atkinson, 2007). I resonate with Geertz (1973) when he states that his intention with ethnography is not to become native or mimic the natives, but to establish a connection to engage in a meaningful conversation with individuals in the community. The goal behind engaging in these conversations to collect those thick descriptions, for Geertz, includes the ability to solve or reduce incomprehension about a certain action, belief, norm, or behavior within the culture. It is not just about descriptions, but also about how an ethnographer is able to use those descriptions to further scholarship. As Maanen (2011) quotes (Barthes, 1972), ethnographers “decode one culture while recording it for another” (p. 4).

For all the reasons noted above, I decided to conduct this study using ethnography. As with every method, ethnography has its advantages and disadvantages. Some advantages include: being able to collect thick descriptive data by allowing the researcher to experience up-close or from within a culture, having the ability to accommodate the unexpected or the unanticipated,

and having the ability to examine and explore a participant's point of view more closely and in detail (Becker, 1996). Some disadvantages include: being a time consuming process to not only gain access and establish trust with participants, but also to gather data in order to reach saturation, and the potential of researcher bias affecting interpretation of data (Keyton, 2011). Ethnography however came across as the method that would allow me to answer my research question. As Hammersly and Atkinson (2007) note, we as individuals living in a social world are capable of acting and also reflecting on our actions as objects. They state that as researchers we should take advantage of this ability to study the social world that we are a part of in order to develop or test theory as much as we can instead of relying solely on what is traditionally labeled as empirical research. Hence, I choose to study my research question using ethnography.

## CHAPTER 2

### IN COMMUNITIES

This chapter includes three sections. The first section discusses the recruitment process of gaining access to two community groups. The second section puts forth the specific data collection points. The third reviews aspects of rigorous research such as validity, reliability, and trustworthiness.

#### ***Recruiting Activist/Community Groups***

In order to receive permission from Cornell University's Institutional Review Board (IRB), I submitted an Initial Request application detailing my plan to study two activist organizations focused on hydraulic fracturing. The application with relevant documents was submitted on November 17, 2014. On November 26, 2014, I was instructed by IRB to gather letters of support/approval from the community groups in order to help with IRB's decision-making process. I began the recruiting process. In order to identify the activist groups in the community, I accessed Cornell University Library's (CUL) archive for websites with hydraulic fracturing. I first accessed the archive on July 01, 2014. At the time, 19 of the 57 organizations that were against fracturing had an active website presence, i.e., with daily or weekly updates to at least one of their pages. I contacted via email two of the most active groups: one pro-fracturing group and one anti-fracturing group. I sent a recruitment request email on November 26, 2014 to the two groups. I received an immediate response from the anti-fracturing group. It is possible that I received the quick response because I had already met with one of the founding members of this group on November 20, 2013, during a preliminary study conducted to develop the

proposal for this research study. We agreed to meet on December 03, 2014. I explained the proposal and towards the end mentioned about my efforts to also study a pro-fracturing group. The founding member informed me that it would be difficult for members of the anti-fracturing group to be able to trust me if I were to also study a pro-fracturing group. The member explained that they had been scarred before by trusting the wrong people. Given the significance of establishing trust with participants while conducting an ethnographic study, I chose to bound my research to studying only anti-fracturing groups (Feldman, Bell & Berger, 2003). I never heard back from the pro-fracturing group I had initially contacted.

In order to protect the confidentiality of these groups, I will use pseudonyms to discuss the groups and their members. The founding member, Paige, introduced me to one of the more local community groups called the Green Squad, that according to her met more frequently with each other and were more active in organizing events. Paige requested that I send her an email with my CV, research focus and experience, and a brief description of my study on December 10, 2014. I responded to her with all the details on that same day. Paige invited me to attend their meeting of the Green Squad on December 15, 2014. I was in the process of gaining access to this group, I accepted. I attended the meeting where I presented my proposal. I did not make any record of this interaction, as I wasn't yet approved to collect any data by the IRB and had not yet received any consent from the members. The interaction however helped the members decide whether or not they would let me study their group. I left the meeting immediately after I presented my case, upon their request. I was informed that same night, via a text message from Paige, that the group agreed to let me in as a researcher. They sent me a letter of support/approval on December 30, 2014. On January 27, 2015 I submitted the letter to IRB and also amended my initial review form to state that I would only be focusing on anti-fracturing

groups. It was not until February 17, 2015 that I received IRB approval to start collecting data with Green Squad. I was able to have all members sign the consent form before the first event organized by the group on March 22, 2015. This was the first data point with the Green Squad.

Two months into collecting data with the Green Squad, I began planning to recruit my second community group. To ensure that members of the Green Squad felt comfortable with my second community group, I requested them to make suggestions. The first group they all agreed would be a great addition was called the Mighty Earth Warriors. They were a well-known group within the activist community. Paige volunteered to help introduce me to the Mighty Earth Warriors. On May 25, 2015, I sent out an email introducing myself and the research project, cc-ing Paige. I received an email the next day from one of their members agreeing to meet with me. Paige then responded to that email the next day to introduce me as well. I met with the member of the Might Earth Warriors on June 5, 2015. Again, due to the lack of having any consent from the member or IRB, I did not collect any data. In the meeting, I introduced myself and explained the research project. On June 8, 2015, I also followed up with an email introducing myself and the project that she could share with the members of the group. This email was similar to the one I sent to Paige on December 10, 2014. The member then invited me to attend one of their meetings on July 6th. I attended the meeting, where I again presented myself and my proposal. There were some members who were very concerned about confidentiality. I presented my case and invited them to email me or call me, should they have any questions. I also mentioned that they could talk with anyone in the Green Squad about me or my process. On July 13, 2015 I first received an email that the group agreed to let me in, however with some conditions, and a few hours later received an email saying they couldn't come to an agreement as to whether or not to let me in to study their group. In the next two days, I presented them with consent forms and

answered their concerns. On July 15, 2015 I received an email stating that the group rejected my proposal to study their group.

The Green Squad then proposed working with the Nature Protectors. The caveat was that three members of the Green Squad also belonged to the Nature Protectors. Ely and colleagues (2001) discuss the importance of flexibility while conducting qualitative research. They discuss being flexible with intellectual views instead of practicing cognitive rigidity, and also discuss the need for researchers to be flexible with new data and new research circumstances that aren't exactly in line with their initial vision. I decided to consider adding the Nature Protectors, as the opportunity presented a new line of ideas. By adding Nature Protectors, I could study not only the themes emerging in two groups, but could potentially study the identity of the members belonging to both groups. I was invited to attend the Nature Protectors' meeting on August 25, 2015. It went similar to the first meetings with the Green Squad and the Mighty Earth Warriors, where I introduced myself and my project. On August 31, 2015, I received some questions and concerns, also related to confidentiality, from Paige (who was one of the members who belonged to both groups). I responded with detailed responses on September 1, 2015. On September 8, 2015, I received a confirmation email from Paige stating that the Nature Protectors agreed to let me in to study their group. On September 14, 2015 I received a letter of support from the Nature Protectors and as of September 28, 2015 IRB approved my request to add the group to my study. I was able to start collecting data the next day at their meeting.

### ***Data Collection Points***

I conducted three rounds of interviews, audio recorded seven monthly meetings, and video recorded three of the four public events of the Green Squad. I conducted one round of interviews and audio recorded three meetings of the Nature Protectors. Twelve research

assistants transcribed the interviews, meeting recordings, and event recordings. I also took notes in my research diary of observations before, during, or after each of these data collection points. There were seven members in the Green Squad and also in the Nature Protectors. One of the members in the Green Squad was relatively new and attended one meeting and one event. This member however was available for interviews. Three members of the Green Squad are also a part of the Nature Protectors. Some members in the Nature Protectors attended only one of the three meeting I attended and were not receptive to interviews.

### ***Rigorous Research***

Conducting research with rigor suggests that the researcher has taken sufficient measures to ensure producing valid, reliable, and trustworthy results that can be transferrable. In this section, I will discuss the measures I have taken to produce this research in a rigorous way.

**Validity.** Merton (1973) in a seminal article put forth the four norms of science. One of the four norms he termed “disinterestedness.” A scientist is expected to conduct his research with a total disinterestedness or maintain an objective stance about the process and should remain unattached to their work. Mirtroff (1974) however, suggested that there is a social ambivalence in the scientific community, where both norms and counter-norms of science co-exist and help keep the community of scientists going. Mitroff offered the counter-norm of “interestedness” where scientists are interested or invested in the products of their work as they are in competition with their colleagues and also desire recognition. As in the natural science community studied by Merton and Mitroff, the social science community also faces social ambivalence about disinterestedness and interestedness. Qualitative research especially is questioned for its validity and reliability. Dr. Lee Humphreys in her Qualitative Research Methods class often stated that bias is not a bad word in qualitative research. She said that part of a rigorous qualitative study

was about recognizing the ways a researcher's perspectives can influence their descriptions and interpretations and how being upfront in discussing them could help render validity to their findings. In other words, interestedness is one of the outcomes of the process of conducting (qualitative) research, but building an awareness around the potential influences that arise from such immersion-related biases can be reduced by recognizing them and discussing them during analysis. One of the ways I practiced maintaining active awareness, throughout the study, was by taking note of my role in the activist communities. I present a brief analysis of group's perspective and my perspective on how I strived to maintain my role as a researcher in order to ensure collecting valid data to perform a valid analysis.

Clawson (2012) presented the various challenges of setting up the role of the researcher when studying communities. As another famous ethnographer, John Van Maanen (2011) discussed, researchers conducting ethnographies in groups "it seems, learn to move among strangers while holding themselves in readiness for episodes of embarrassment, affection, misfortune, partial or vague revelation, deceit, confusion, isolation, warmth, adventure, fear, concealment, pleasure, surprise, insult, and always possible deportation" (Maanen, 2011, p. 2). Using observations that cover almost the spectrum of such experiences throughout the study, I will first discuss how the group has responded to my role as a researcher in the group, and then discuss the role I strived to achieve and ultimately ended up playing.

I explained to both groups, the Green Squad and the Nature Protectors, my role as being a researcher who is interested in studying groups involved in scientific controversies. I did not request membership in the group, but wanted to act as more of an interested individual who believed their groups had a lot to offer to my study. Multiple instances however displayed that for some members in the group, I was more than just a researcher; for others, I was just a

researcher; and for some this was a gray area. Here is a list of a few experiences that indicate the differences in how my role was perceived.

One of the constant questions I was asked by a few members of the Green Squad was if I was getting some useful data or if I was getting what I was looking for in these interactions. It was often Adam who enquired about this. He first enquired about this after his second interview and continued to do so at the following events. Vanessa and Paige also enquired about this during their second and third interviews and also at the events. It felt good to know that the members cared about my research, but it also served as a reminder that they were aware that I was a researcher collecting data. I kept assuring them that the biggest gift they could give me during these interactions was them being their true and authentic selves. Interestingly, the three members who would check in about this were also the same three members who were also a part of the Nature Protectors. In the last meeting I attended of the Nature Protectors, there was a discussion around managing social media presence. Adam, apparently jokingly, recommended that I be given charge of handling their social media page. Paige immediately jumped in to say that I was a researcher and not a member. This was possibly the most explicit instances that indicated to me that for some members my role as a researcher was quite dominant. In another interaction with Riley, also a member of the Green Squad group, I asked her about the contributions each member made towards the group. She expressed concern that I was asking her to “talk about” or “gossip” about group members. I quickly explained my question and the intention behind the question, and Riley proceeded to answer it with ease. In other instances, where I spoke with other members of the Green Squad and the Nature Protectors about contributions each member made to the group, no one included me in their responses. All these were signs that indicated that they did not see me as a member of the group. For Adam, Vanessa,

and Paige however this was more blurred, in that they saw me as a researcher, but also as something more.

Linda, one of the members of the Nature Protectors was often warm and kind with her words to me. She made me a green bracelet (because I mentioned it was my favorite color during the first meeting of the Nature Protectors that I attended) for my birthday and brought it over during my interview with Devin to personally gift it to me. This thoughtful gesture indicated to me that for Linda, I was not just a researcher. Along similar lines, Vanessa after her second interview mentioned that she finds the interviews to be almost therapeutic. When she and I were returning from attending a public meeting, we engaged in a long conversation about our personal lives. In the end, she mentioned feeling comfortable around me and felt like she could open up to me easily. This also indicated to me that for Vanessa, it seemed that I was not just a researcher.

During the meetings of both the Green Squad and the Nature Protectors, they displayed a sense of comfort around me. When something sensitive would come up, they requested that I stop recording it, but never asked me to step out of the room. This displayed a level of trust that the groups felt when it came to disclosing their strategies. If they treated me as just a researcher, they could have easily asked me to leave the room. Every meeting in both groups had occasional humor, which included ribbing about either the members present there, members of the group not present at the time, and sometimes about others outside of these groups. This was also an indication that they felt comfortable enough to joke around me.

Another indication of members feeling comfortable around me was that they started being affectionate towards me. At the end of the first meeting of the Green Squad that I attended, one of the members named Bridget hugged me and said that it was a hug from her heart to mine. Hugging me soon became a norm in the Green Squad. Bridget continued to hug me before or

after every time we met. Adam, Paige, and Vanessa started hugging me too. Charles, Phil, and Riley never initiated a hug. Charles however always offered and gave me rides after our interviews. Phil once offered a ride when I was travelling for a personal reason. Among the other members of the Nature Protectors group, Linda hugged me every time we met and Martin hugged me at the last meeting. Vanessa gently petted my head while saying goodbye at the end of that meeting. Other members of the Nature Protectors group did not initiate any hugs. These displays of affection also indicated that some people began feeling comfortable around me, but also seemed to be seeing me as being more than just a researcher in their communities.

One of the first instances that made me question my role in the Green Squad was when the group had asked if I could share my video recording of their events. The group had initially hired a local videographer to record an event in March, 2015. I was planning on using that video for my research as well. On the day of the event, Paige had forgotten to bring the SD card for the camera. Phil rushed over to bring his card to help. The card had very little space left on it, which they did not realize before beginning to record the event. About 15 minutes into the event, the videographer packed up the camera and left, because there was no more space left on the card. Paige's partner and Charles tried to record a few minutes on their iPads, but couldn't capture the entire event. Due to the failure to video record at this event, the group asked if in the future I could record their videos. I was planning on video recording the events myself this time for this study. I initially did not think this would become an issue, but it turns out it wasn't as simple as I thought. My advisor recommended checking in with the IRB about this detail – of me, as a researcher, recording and sharing the video of the public event with the members of the Green Squad (the group organizing these events). At first IRB said that I couldn't share my recording with the group as I had said in my IRB form and the consent/confidentiality form that I would

not be sharing the recording with anyone not on the research team. Upon some back and forth (during May 12, 2015 to May 28, 2015) with my advisor, Dr. Bruce Lewenstein, and the IRB I was able to resolve the issue by amending my consent form to include that the video recording of the events would be shared with the group. Being able to conduct these recordings for the group, in addition to my research, made me feel a part of the group. I felt that I was contributing to the group in some ways. I was very aware that I was still a researcher and not a member, but I also noticed that I felt a need and wanted to contribute in some way to the group. I felt mixed about my role as a researcher who was also in the group.

I made some minor changes in my activities to help members feel comfortable around me. For example, for the first event that I attended, Paige offered to drive me to and from the event. She said she was giving the speaker a ride to and from a similar location and so it would not be a problem. I accepted the offer. When I entered her car, she immediately smelled my perfume. For a substantial time in the car, she rolled down her window and explained her discomfort around perfumes. She explained the harmful chemicals that she was allergic to, and then also discussed the harmful ways in which these products are made and affect individuals. While I do not consider myself to wear strong smelling perfumes, I could tell that it made Paige very uncomfortable. I made it a point to not wear any perfume and bought a deodorant that had no smell for all future meetings, interviews, and events. We have not traveled in a car ever since then, but this was a change I felt I could make to help Paige feel more comfortable around me.

While I made a few changes such as giving up perfume during my interactions with the Green Squad, I did not strive to give a sense of false togetherness (Clawson, 2012). In other words, I strived to remain who I am. Members of both groups sometimes expressed interest in my opinion. One specific instance that I recorded was during an interview with Devin, a member

of Nature Protectors, when he questioned my take on the United States government. I felt caught off guard, and decided to provide my views on the Indian government instead. I explained that I felt more comfortable talking about the Indian government, because I had experienced it more closely and for a longer duration. I shared my honest opinions and frustrations with the Indian government. We agreed on the frustrations around corrupt governments officials, while we were talking about two different governments. While in this instance I found some common ground with Devin, in another instance Adam and I did not see exactly eye to eye. In his third interview, we spoke about the presidential debates. We did not agree on some of the political positions of candidates in an on-going election. We moved on from that discussion having learnt something about each other's positions, but neither one of us was trying to argue or convince each other. We eventually moved onto the interview. In both instances, I tried to maintain my authentic self and not say things that I did not believe. Every interaction I strived to be and was myself.

I also did not spend time with the members socially outside of research interactions. I was not aware of any casual social gatherings outside of their meetings or events for both groups. While there was some conversation among members to indicate that they would meet each other over a meal or coffee, it often seemed more of an intimate one-on-one conversation. I was not aware of any social get-togethers that all the members engaged in with an intention to just spend time together. The members all seemed either to be busy with their own schedules or lived too far apart from each other that they did not seem to be able to or care about devoting any time for such social activities within the groups. On a few occasions, I did interact with group members outside my main research settings (interviews, meetings, and events). In one instance, there was a local community event that took place where various organizations had stalls in a community center. Nature Protectors had a stall and I attended the event, not to collect data, but to meet the

members. There was also a time where Vanessa and I attended a public meeting together. In another instance, there was once a tentative plan suggested by the women in the Green Squad to watch the movie “Suffragettes” together. The plan however never materialized. Other than these instances, I met the members only during the interviews, meetings, or events they organized. It is very well possible that I was not invited to be a part of any of the social gatherings organized by either groups. I know only that I have never experienced these individuals in social settings other than for the purpose of my research or an event that related to one of the groups’ focus. I met the members and connected with them only during their meetings, events, or for an interview. A lack of this casual social interaction also helped me keep my distance from the members of both groups.

While I consciously strived to keep myself at a distance to study both groups, I started feeling emotionally closer to members of these groups. At the end of the first interviews with the members, I felt a sense of closeness to each one of them. A significant portion of the first interview was dedicated to their experiences. Beginning with their childhood, we discussed their life journey that brought them to where they are as individuals in these community groups. Towards the end of the interview, I asked if they wanted to know anything about me. It was often about my story. While I did not go into as much detail as they did, I felt comfortable and also felt it necessary that they know where I was coming from and who I was as an individual. Eventually, the hugging and the other instances discussed earlier of help, concern, and care displayed by the members, also contributed to these feelings of closeness. I noticed that I felt a sense of closeness with them more so during interviews than during events or meetings. Personally too, I was observing in instances when I was spending time with colleagues or friends that I enjoyed one-on-one meetings more so than group meetings. I felt closer to the individual I

was present with and felt that I could more easily connect with them. I could not tell if my research influenced this feeling in my personal life, or vice versa. I at least recognized that I was becoming more aware of this realization at the same time.

According to Ely and colleagues (2001), “feelings of intimacy and warmth towards one’s research participants are not only natural but in general represent a positive phenomenon.” (p.112). They explain that feeling empathetic or connected to the participants could help the researcher more thoroughly understand their participants, their views, opinions, and actions. They also stress that being able to not get “too close for comfort” or “too far for comfort” is necessary, and that researchers should practice maintaining an emotionally balanced or emotionally intelligent approach to analyzing data. I have strived hence to keep a record of my feelings and thoughts about individual members and experiences, in order to identify and resolve feelings I felt emotionally with members of both groups. One specific instance that indicated that I was potentially becoming emotionally involved with my groups was when I realized how strongly I felt about protecting their confidentiality. While every researcher maintains and values confidentiality of their participants, I started to realize that I felt a little too strongly about their confidentiality. The realization came when I was deliberating in my mind whether or not I could discuss that the two groups were anti-fracturing. I realized that I was letting my emotions get in the way of being overly protective with the groups. I then made a plan of revealing that the groups I was studying were anti-fracturing, but resolved to not disclose their locations, group names, or names of individual members. I am also striving to not disclose irrelevant information that could cause any disharmony among the group.

Overall, validity in qualitative research is “not the result of indifference, but of integrity (Fred Hess, quoted in Maxwell (1996), p. 91).” He added that validity is related to the process

and is more about the quality of evidence than it is about the methodology. I presented above the process through which I strived to maintain an awareness of my emotional connections or lack thereof with members of the groups to help me analyze the data with an awareness of my potential biases (Clawson, 2012; Ely, 2001; Lofland, Snow, Anderson & Lofland, 2006) in order to maintain valid data collection and analysis.

Besides researcher bias, Maxwell (1996) also discussed the threat to validity from researcher reactivity, where the researcher could have an influence on the participant or the setting. According to him, this threat is high while conducting interviews as the researcher is more likely to influence the participant's responses or behavior through their line of questioning. He finds the threat of researcher reactivity to be relatively low for observational studies. In addition to avoiding leading questions during interviews and describing potential researcher biases, I have triangulated my findings through the data acquired during observations and data gathered through interviews. This approach follows the recommendation made by Fielding and Fielding (1986), wherein the researcher triangulates with the purpose of reducing the potential of errors in one method by employing another method.

According to Lincoln and Guba (1985), "member checks" can also contribute towards ensuring validity of data and analysis by: allowing participants to respond to the researcher's characterizations of the intentions behind their actions or words, allowing them an opportunity to clarify errors in their statements or analyses, allowing them to volunteer additional information to better explain their statements, and establishing a record for saying what they did. I conducted member checks through a few interviews to ask for clarification along the way about statements they made or sentiments they expressed. I also shared the three main thematic findings with the

members in the group during my final interview with them to check accuracy in my analyses. Member checks increased my confidence that the data and the analyses were both valid.

Maxwell (1996) also recommends employing comparisons to ensure reducing, if not eliminating threats to validity. The findings from studying the group Green Squad have been compared to those from the group Nature Protectors. This approach has helped identify the findings that are specific to the Green Squad and others that hint towards a more general understanding of activist/community groups.

**Reliability.** While many researchers describe the need for reliability, Kirk and Miller (1986) present a discussion on the problems of measuring reliability while conducting qualitative research. They present three types of problematic reliabilities: quixotic reliability, diachronic reliability, and synchronic reliability. Quixotic reliability is when an observation presents the same result with every measurement. They indicate that this isn't a good measure of reliable ethnographic work, because if the participant is always producing the very same response then the data collected could be rehearsed or unauthentic. They provide the example of a broken thermometer producing the very same result every time, or the "knee-jerk" response of "I'm fine" that Americans often provide in response to the question "how are you?" The second type of reliability they discuss is called diachronic reliability, wherein an observation leads to the same response over a period of time. They state that the difficulty with this type of reliability measure is that it is an acceptance of the assumption that nothing or no one in the social world change over time. As they so succinctly put it, "to make such an assumption is to deny history." The final type of reliability they discuss is called synchronic reliability wherein observations produce coherent results within a specific period of time that align with a specific feature of interest for the researcher. According to them, an ethnographer can thrive on the failure of this

type of reliability, because then it offers an opportunity to consider other measurements that could be a contributing factor.

Kirk and Miller (1986) discussed issues with reliability not to dissuade qualitative researchers from producing reliable research, but to point out the need to conceptualize the meaning of this measure differently. According to them, reliable qualitative research relies not so much on data itself, but on the researcher and their influence during collecting and analyzing the data. They recommend using field notes during the collection and analysis of data. They stress that in addition to helping the researcher present reliable research, field notes can also help relieve emotional tensions or intensities experienced by the researcher. I employed field notes that recorded my observations, thoughts, and feelings before, during, and after an interview, meeting, or event with both groups. I have used them in this chapter already, and will continue to draw on them during the remaining chapters of this study.

**Trustworthiness.** Lincoln and Guba (1985) present multiple ways to ensure producing a trustworthy study. One of the first recommendations they provide is “increasing the probability that credible findings will be produced” (p. 301). They recommend prolonged engagement, persistent observations, and triangulation. Prolonged engagement, according to them, involves spending sufficient time in the field to learn their culture, gather trust in the communities, and ensure sorting through any distortions introduced by the researcher or the participants. Having met time with the members of the group met for over a year with the Green Squad and for about six months with the Nature Protectors, I was able to learn about their culture, reach data saturation with two themes of analysis using two different methods of data collection (observations and interviews), and establish trust with these communities. I do not make claims that the research data on all emerging themes potentially possible from this data have been

saturated, only that the themes presented in this study are of those that have been saturated. The data collected for this study has the potential for many more emerging themes.

Lincoln and Guba (1985) also recommend peer debriefing to improve trustworthiness of research. They recommend opening up the research data and analysis to peers to gather any implicit or unnoticed findings. Members of my committee, my research assistants, and the numerous colleagues in the Departments of Communication and of Information Science at Cornell University have been a part of the peer debriefing team. Confidentiality measures were taken while opening up the research data and analysis to peers. These peer debriefing measures taken help render this study to be trustworthy.

### ***Conclusion***

Overall in this chapter, I discussed the process of collecting and analyzing data. I also presented a discussion of various measures taken to ensure this was a rigorous research study. In the next three chapters, I will elaborate on the three main themes that emerged in this study.

## CHAPTER 3

### TRANSACTIVE MEMORY SYSTEMS AND COLLECTIVE MINDS

Through my observations, I began to see that these activist groups were functioning as a team or an organization where each activist was working individually and also collectively towards a common goal. The Green Squad and the Nature Protectors can be considered a group or an organization as they are comprised of people, who engage in purposeful and ordered activity (Keyton, 2005). For the purpose of this study, the terms “groups” and “organizations” are used interchangeably. This is not reflective of the extensive scholarship that has defined these terms to mean different things. For this study however the terms “groups” and “organizations” are used to mean collectives that fulfil the criteria that Keyton (2005) outlines to define an organization. Both groups functioned by dividing their intellectual and logistical responsibilities individually, and then collectively came together to strategize and act. This mode of operation closely relates to two theoretical concepts in existing literature: Transactive Memory Systems (TMS) and Collective Minds (CM). The theoretical framework of TMS and CM has been used to study groups and organizations, and so can be applicable for this study. In this chapter, I will first review literature on TMS and CM. I will then present evidence for TMS and CM in the Green Squad and the Nature Protectors.

#### ***Literature Review***

According to Lev Vygotsky (1987), groups are optimal learning spaces. He described learning as a process which involves interactions on the social plane with peers and interactions

with oneself i.e., an aspect of internalization. In other words, for Vygotsky, learning happens through participation in activities and in dialogue with others in a group and with oneself.

While members in the Green Squad were all against hydraulic fracturing, they differed in backgrounds or early experiences that brought them to activism, in ideologies that influenced their intentions to engage in activism, and in their notions of what constituted activism. A more interesting difference they had, which related directly to my research question of learning, was their knowledge systems or areas of expertise. I noticed that not everyone in the group carried the same knowledge, and that they indicated relying on each other for different information. This theme has been explored in the literature in terms of the theory of Transactive Memory Systems (TMS) and Collective Mind (CM), which explain the processes of these different knowledge systems contributing to the functioning of groups.

According to Yoo and Kanawattanachai (2001), TMS and CM might seem to be the same, but are different yet interrelated processes. They explain that TMS provides a memory system to store and retrieve knowledge in groups and CM allows TMS to be appropriated in groups (Moreland et al., 1996). In this chapter, I will first define and discuss TMS and CM as presented in the literature and then illustrate TMS and CM in the Green Squad and in the Nature Protectors.

**Transactive Memory Systems (TMS).** Daniel Wegner is one of the scholars who is often credited with the birth of TMS in literature. Wegner, Giuliano, and Hertel (1985) and Wegner (1986) noticed how couples in close relationships developed a memory system to remember the specific domains of expertise of their partners and themselves. Essentially, each individual knew what they and their partner were good at handling or contributing towards their relationship. They termed this system a transactive memory system. According to Lewis (2004),

TMS is the “cooperative division of labor for learning, remembering, and communicating [group] knowledge” (p. 1519). Jackson (2009) defined TMS as a “form of socially shared cognition [that] can lead to greater information sharing in groups” (p.509).

Once each member is able to establish a transactive memory at their individual level, they can then collectively start to form a Transactive Memory System (TMS). Peltokorpi (2008) indicates that TMS arises often because of the limitations in an individual’s cognitive abilities to learn, remember, and apply multiple domains of knowledge.

According to Wegner, Giuliano, and Hertel (1985), there are three stages to developing a TMS: encoding, storage, and retrieval. In the first stage, individuals engage in encoding through interactions with each member. In this stage, they begin to code which group member brings what knowledge or area of expertise to the group. In the second stage, members learn which information they need to store and which information their group members are able to store. In other words, they are able to distribute amongst their members storing necessary information for the group’s goals. This relieves each member from storing information that is outside their domain or expertise, and each member serves like an external hard drive for others. Or as Kozlowski & Ilgen (2006) call it, members become external cognitive aids. In the retrieval stage, members are able to rely on each other to retrieve information relevant to their specific domain during problem solving or decision making. This stage can only occur effectively if individual members encoded the different expertise and stored appropriate information necessary for their domain.

TMS does not claim to predict or explain the emergence or behaviors of individual members, but instead describes how individuals in groups are able to learn through encoding, storing, and retrieving knowledge to accomplish sometimes individual goals, but mostly group

goals (Majchrzak, Jarvenpaa, & Hollingshead, 2007). Individuals in the group must have a shared understanding of who knows what in the group (Majchrzak, Jarvenpaa, & Hollingshead, 2007) and that knowing affects how members learn individually (Hollingshead, 2000).

This theory eventually spread from the area of interpersonal communication to organizational and group communication where studies have shown the presence of a TMS and its potential role in groups (Hollingshead, 2000; Yoo & Kanawattanachai, 2001). The presence of a TMS is often found to be correlated to the group's performance (Hood, 2014; Lewis, 2004; Rulke & Galasiewicz, 2000). A literature review indicates that there are two main factors that influence the development of TMS in groups.

The first factor influencing the development of TMS is the relationship between members of the group. For two years, Lewis (2004) studied 71 MBA consulting teams who were assigned a project from client organizations. With time, he noticed that the groups either developed a sense of high or low familiarity between members. He found that having a higher level of familiarity within members of groups resulted in strong relationships between the different experts or members in the group, thereby resulting in the emergence of an effective TMS. But the higher the familiarity, the higher the chances of conflict. Pelled (1996) found that when a relationship conflict arises in a group, members become unwilling to listen and comprehend their rival's comments, and also ultimately choose to discredit their knowledgeable contributions to the group. In line with Pelled, Rau (2005) studied 126 groups and found that as relationship conflicts increased in groups, distortions in their overall TMS started to occur. He found that as relationship conflicts increased, members started to relocate expertise which altered their transactive memories. As individuals in conflict would not alter their transactive memories similarly, this altered the overall TMS in groups. Hood (2014) found that smaller groups were

more prone to being intimately tied to each other and hence were more likely to experience relationship-based conflict. He found that larger groups tended to have more task-related conflicts. An increase in either kind of conflict, he found, decreased the group's performance. Overall, establishing a working and trusting relationship among members seemed to suggest a more coherent and effective TMS in groups.

The second factor influencing the development of TMS is communication among members in groups. According to Hollingshead and Brandon (2003), communication facilitates the development of TMS. They assert that communication is essential in forming those initial codes of expertise during encoding stages, and also to help asking other members to recall relevant information during group collaborations. In addition, Lewis (2004) found that there is a correlation between the degree of communication among members in the early or planning phases of the group and the level of maturity in their TMSs observed during their implementation phases. Lewis (2004) found this relation to be strongest for groups that communicated face-to-face versus those that interacted virtually. Furthermore, Chen and colleagues (2013), who studied 216 open source software teams, found that communication quality improved TMS by increasing knowledge credibility, knowledge location, knowledge sharing, and also the use of mailing lists or other technologies among members in groups. Additionally, Choi and colleagues (2010) studied 139 groups and found that groups that used information technology (IT) services such as search engines, document storage, intranets, and online discussion boards to support their knowledge management were able to develop a better sense of TMS. Overall, using different forms and functions of constructive communication contributed to a better development of TMS in groups.

As TMS develops in groups, members begin to develop their individual identities in these groups as well. Whelan and Teigland (2013) present one set of identities that get established in groups. According to them, members become either technology scouts or central connectors. Technology scouts, according to them, scout for or scope out relevant information. Central connectors are those who distribute gathered information to all or specific members in groups. Rulke and Galasiewicz (2000) have found another type of identity classification. According to them, members either become generalists or specialists. Members either start learning information relevant to multiple areas (as generalists) or learn information pertinent to their specific area of domain of expertise (as specialists).

Depending on their role or identity in the group, members either participate in exploitative learning or exploratory learning (Li and Huang 2013). Li and Huang explain exploitative learning as being “refinement, efficiency, and improvement” based learning and exploratory learning as being geared toward “search, discovery, and experimentation.” Li and Huang (2013) found that specialists related more to exploitative learning than to exploratory learning. They also found that the interaction between exploitative and exploratory learning was positively related to both group efficiency and group effectiveness.

As Yoo and Kanawattanachai (2001) point out, establishing a TMS is the first step towards developing a CM. It is through the CM that TMS is appropriated.

**Collective Mind (CM).** As Wegner is for TMS, Weick and Roberts are for CM. The origins of collective mind or collective consciousness however can be tracked back to Émile Durkheim (1893) or Franklin Henry Gidding (1904). Gidding’s view on CM is more along the lines of describing a like-mindedness that emerges in groups (for example, the “American” mindset is a phrase that illustrates his meaning) (Park, 1921). The use of CM here aligns more

with Durkheim's conceptualization of a collective consciousness, which is a group's collective consciousness that supersedes in many ways the individual members' consciousness (Park, 1921). Weick and Roberts (1993) are often cited during a discussion on collective mind. Weick and Roberts (1993) explain collective mind by first discussing the concept of neural networks and their influence on the field of connectionism presented by Sandelands and Stablein (1987), and second by discussing the work conducted by Hutchins (1990) on flexible and robust organizational systems.

According to Sandelands and Stablein (1987), groups are systems that carry thoughts and meaning is collectively created through the connections established and engaged between members of a group who are all bound by the network of the group (Weick & Roberts, 1993). Hutchins (1990) adds to this theoretical conversation by presenting the idea that, while it could seem desirable in groups to have mutually exclusive knowledge bases, what makes a group network flexible and robust is having an overlapping distribution of knowledge. If members carried absolutely mutually exclusive knowledge bases, then the group is more likely to experience a breakdown when a certain member is not able to perform at any given time. On the other end of the spectrum is what Emery and Trist (1973) and Morgan (1986) call a "holographic conception," where all members know equally well about all knowledge bases. This, according to Hutchins (1990), can be rare and also potentially expensive in time and effort. Ideally then, they suggest having some overlap in knowledge between members, while maintaining their unique knowledge bases.

Weick and Roberts (1993) draw on these two ideas of connectionism (Sandelands & Stablein, 1987) and distributions of knowledge (Hutchins, 1990) to present collective mind, which focuses on the interrelated activities between the members of a group or as they prefer to

call it, a collective. Weick and Roberts (1993) stress the need for these interactions to be “heedful,” i.e., to be mindful and intentional. They draw from Ryle’s (1949) contribution that explains that heedful performances by a mind result in intelligent decisions. While Ryle (1949) focuses on an individual’s mind, Weick and Roberts (1993) utilize heedful performances towards the idea of a collective mind. They stress that heedful interactions are what make groups capable of being flexible and robust in handling issues or tasks. Weick and Roberts (1993) also stress that along with heedful intentions, members should also be representative and be comfortable with some amount of subordination. According to them, members of the group should be able to represent some differences in their expertise from one another, and must also be comfortable with releasing control to other members when others’ expertise might be more relevant or needed. A collective mind then is established in a collective, or a group, when members with potentially overlapping yet representational knowledge bases are able to heedfully contribute and interrelate through their actions of control and subordination to keep their collective running and performing with minimal to no hiccups or failures. McPhee and colleagues (2006) stress that any form of such actions need to be heedful and that heedfully formed CMs are a significant factor in highly functional groups.

Brockmann and Anthony (1998) use two examples to illustrate an effective CM and its influence on a group’s performance: one, of an orchestra in a symphony where musicians are responsible to play their instruments at different moments to perform a piece, and two, when players in a sports team are carrying out their individual roles in a game. In both examples, the musicians and the players are aware of their role, of their moments to contribute, and of the entire play. They are also very mindful of their position, contributions, and the entire piece to play. In both situations, they are prepared to handle expected and sometimes unexpected

situations. Brockmann and Anthony use both these examples to describe two ideas: one, that CM allows these players to act as an entity with a shared consciousness, and two, how a working CM could contribute towards a group's performance. Establishing a robust and flexible CM has been proven to take time and communication effort, and can be instrumental in a group's performance not only during anticipated situations but also during unexpected occurrences (Crowston & Krammerer, 1998; Curtis et al., 1988; Faraj & Sproull, 2000).

According to Tollefsen (2006), the idea of a mind existing outside individual bodies and which is shared between individuals is a conceptual shift that many struggle to make. According to her and many other critics, mind is not contained in an individual's body. She invites these critics to make a conceptual shift by stating, that mind

“is not a name for a substance; rather it names a whole host of cognitive processes, dispositional states, connotative and agential behavioral dispositions. The picture of mind that comes out of [Clark and Chalmer's] work is that some of these states and processes supervene on features outside of the body [and]...in some cases, other agents. If the mind is a collection of processes and states then the divisions between minds or the merging of minds will be determined according to the role agents and artifacts play in these processes and will be fueled to a great extent by explanatory needs” (p. 147).

She further presents Sloan Wilson's (1997, 2002) argument for how a collective mind is more than the sum of individual minds put together. This is similar to the argument made using neural networks, where the mind is more than just a collection of neurons. She presents Sloan Wilson's argument that groups in deliberation engage in assessing, analyzing, and deciding on issues that lead to them co-creating a knowledge that is a combination of individual contributions but also emergent of new knowledge that couldn't have been conceived by them individually. Here then,

as Weick and Roberts (1993) have mentioned, it is through (often communication-oriented) actions that the CM develops.

**Transactive Memory Systems & Collective Minds.** Establishing a TMS i.e., knowing each member's expertise or area of contribution to the group can be the first step towards mindfully integrating and coordinating those knowledge systems to make for a collective mind (Yoo & Kanawattanachai, 2001). Yoo and Kanawattanachai (2001) argue that TMS could exist with or without a CM, whereas a CM could not exist without a TMS. TMS then forms a foundational element for the development of CM. This implies that TMS is more likely to develop in the initial stages of the group and a CM develops following the development of a TMS, more likely at a relatively later stage of the group. They also argue that changes or improvements to the TMS does not necessarily transfer to changes or improvements in the CM. They also stress that it is only when improvements that in TMS are carried through to their CM that a higher-order of learning occurs in groups.

Yoo & Kanawattanachai (2001) also found that establishing TMS in the early stages of the group's formation significantly contributed to the group's performance. They also found that having more clear and informative communication is essential to establish a strong TMS and CM for groups. Akgün and colleagues (2006) also confirm the mediator role of CM between TMS and group performance, and also the role of communication in establishing relationships between members that also contributed towards developing a TMS and CM, and ultimately the group's performance.

Rulke and Galasiewicz (2000) found that the group structures influence their performances. Group structures were defined early on by Wegner, Giuliano, and Herterl (1985). According to them, there are two types of TMS structures: differentiated structures and

integrated structures. In differentiated structures, each member becomes aware that they know something different from the other members, and share some lower-order information while building on their own higher-order information individually. In integrated structures, members put together their individual lower-order information to socially co-construct their collective higher-order information. Li and Huang (2013) term these learnings as either exploitative or exploratory. According to them, exploitative learning involved “refinement, efficiency, and improvement” and exploratory learning involved “search, discovery, and experimentation” (p. 305). In other words, members in purely differentiated structures or those more prone to exploitative learnings could be the specialists, whereas those in integrated structures or more inclined to exploratory learning could be the generalists. Rulke and Galasiewicz found that groups that had generalists outperformed groups with specialists. They also found that mixed groups performed well if they had intense ties and were less hierarchical in structures. Overall, groups with either generalist or mixed groups relative to specialist groups are more likely to develop a stronger TMS and CM, and also affect performance.

### ***Results***

In this section, I will detail the presence of TMS and CM in the Green Squad and Nature Protectors.

**TMS & CM in the Green Squad.** The main members of the group include, Adam, Paige, Vanessa, Charles, Riley, Bridget, and Phil. Each member’s knowledge is as discussed below:

***Adam, the knowledge base of scientific and technical details.*** Adam was curious as a child and loved learning how things worked. He was,

“always burning something up in that house... Blowing fuses out of the fuse box. Um, my dad shuddered every time he walked into the house like what doesn’t work today? Because we had something work fine and I would take it apart to see why it worked...I mean, of course I never got it back together correctly all the time so. Um, but that was, that was natural... We had a guy down the street who repaired radios, not TVs, he repaired radios and I got to hanging around him and I got to repairing radios.”

In this quote you can notice Adam’s seemingly innate love for learning about science and technology from a young age. In high school, Adam took to electronics and learned DC theory, AC theory, and also was able to put together a short wave radio and also television sets. He however mostly considers himself to be self-taught, because he did not attend college. Adam worked at multi-national companies, where he mentioned staying ahead of his college-graduate colleagues. He has also been passionate about energy issues and along with his partner has built a house that does not utilize fossil fuels.

Every member in this group identified Adam as being the “tech” guy, the “data” guy, or the “detail” guy of the group. He himself realizes that this is his role, being the data guy. This identity seems to have been developing since his childhood, and continues to be growing with him. Usually when Adam was presenting his data during the private meetings, members did not pause to challenge or question his discussion. His presentation was also often quite extensive and full of details; as mentioned, no one questions his discussion. This has resulted in Adam presenting his work in long monologues. Sometimes there are some clarifying questions, but even those are rare and often come from Paige, in the Green Squad.

In his discourses, Adam always specifies details pertaining to data. He avoids talking in generic terms, and often prefers using numbers and terms to accurately represent the detail he is

reporting. You can also notice that often during his reports, other members rarely interrupt him, unless they have a question or jump in to agree with him. There was one time when one of the other members interjected to question his choice of words and claims, and Adam came back strongly. He asked if the member read the entire report, and when they confessed not having read it all, he said, “well I just know you have not read it! And go read it! And then- then come back and we’ll debate that.” That’s when another member jumped in to say, “that’s what I have you for I wouldn’t dream of reading it myself.”

You will notice in the discourse above that Adam, when challenged, came back with immense confidence in his knowing. You can also tell from his response how much he cares about the details, and how he almost feels hurt (in his heart) when anyone gets details wrong or misunderstands them. In a later meeting, he even mentioned how many people read only the first and last page of documents, and how “you have to read the whole thing and understand every paragraph.” Another interesting observation in the discourse above is when one of the members says, “that’s what I have you for, I wouldn’t dream of reading it myself.” This statement seemed to resonate with other members too. This comment was repeated multiple times during meetings and also in emails. Adam and other members are very aware of his role as the person who studies data, verifies data (in an interview, he mentioned running his own calculations to cross-check relevant data presented in government and industry reports), and conveys data to the group. Adam said that we need to let data make decisions. He goes so far as not only checking who is conducting research and how data is presented, but also runs his own calculations and analysis in spreadsheets to understand data. In his words, he says he is “like ducks on a June bug” when it comes to data.

*Paige, the knowledge base for media relations, idea/event coordinator, and source for passionate energy.* Paige went to school for theatre and creative writing and later went back to school for landscape design. She gave herself five years to make it as an actor, and as she was not able to make a substantial living off of it, she landed a job as a researcher for a news magazine. She eventually became a journalist, and now taught journalism at a college. Like many journalists, she explained enjoying delving into multiple issues or perspectives and not just specializing in or focusing too much into one area or field.

Members of the group consider Paige to be a media relations person, given her background and current work position, and also as someone who takes charge during private meetings and events. She usually is one of the last voices during decision-making.

With respect to being the go-to person for media relations, during one of the meetings, Riley took the initiative and prepared a press release, but requested Paige to review it and asked for some suggestions. Paige responded saying how proud she was of Riley and was willing to review it for her. Paige reviews, but also adds details that others without a journalism experience might not know such as inclusion/exclusion of pictures and proper formats for sending emails to media.

In another instance, another member of the group wrote up a press release for one of their events, and although this member did not request edits, Paige jumped in to provide them. Similarly, another member in the group also wrote a press release one time that was replaced or edited vastly by Paige.

Paige also talks about how she has been spending time lately training media personnel on how to write op-eds. In the same meeting, Vanessa requested from Paige a media list which contains email addresses of all current journalists to whom they could send their press releases.

Paige mentioned how they keep changing very often, and how sharing her list wouldn't be the best approach. In a later meeting, Vanessa again mentioned Paige having a better media list. In this meeting, Riley again takes over the responsibility of writing up a first draft of the press release, and Paige responded saying she would make the final edits before sending it off. Overall, Paige, similar to Adam, also seems to recognize her own knowledge area – in her case, media relations. This comes up often in meeting conversations. However, she also considers herself to be the idea person or the person who is relatively more aware of all issues and their connections. This makes sense in that she spends most of her time writing/reading articles that are about current issues. She is also often the person who recommends and schedules speakers for most of the events.

Paige is also the source for “radical energy,” “drive,” and “passion” in the group. There is not a member in the group who did not discuss Paige's passion for activism and for her goal of making a change in society and the environment. There are members in the group who do not agree with her positions or ideologies all the time, but her passion is something that they admire. Her passion could also be the reason behind how much she responsibility she takes on.

***Vanessa, the knowledge base for other groups and coordination/execution.*** Vanessa was brought up in a communist family. She said that at the time she did not feel very influenced by these experiences, but now in retrospect sees how different incidents in her early life have shaped the person she is now. After gaining a degree in sociology, Vanessa also received a degree in Education the same year her daughter graduated from high school. She raised her daughter as a single mother.

Vanessa is one of the members in the group who contributes many times through her actions. As Bridget put it, she is a “do-er.” Riley also recognized Vanessa as being the person

who helps carry through the plans of the group. Both Charles and Riley recognized that Vanessa is part of multiple organizations and so is able to keep better track of different agendas at these groups. Paige recognized Vanessa to be the closest person she has in their local community. She also recognized that Vanessa is someone who thinks before she speaks, unlike herself who does the opposite. Vanessa struggled to identify her own contribution to the group, but eventually realized that she likes to keep herself useful and often gets involved in suggesting ideas for events, planning them, and getting them going.

***Charles, the knowledge base for another group, school board, facilitator.*** Charles identifies himself as being a man of color. Following his training as a war correspondent, Charles spent most of his time as a storyteller and a teacher. One of the roles that Charles has been credited for in the group is his ability to facilitate and keep everyone on track with the set agenda. The teacher in him translates well into his facilitating role in the group. This is something that he still strives to do during meetings. The one meeting that he wasn't present, it was clear that the group had trouble staying on track with the agenda items. It was the only meeting that felt unorganized and dispersed. Facilitating seems to be a skill that he has honed being a teacher and a father to two sons. Members in the group view him as a gentle yet active soul, who reports back on a peaceful civil disobedience group that is also fighting against hydraulic fracturing. He is also on the school board, and brings this knowledge during planning events for the group. Paige called him a follower, although he did run for a leadership position in local elections one time. Charles thinks of himself as more of a follower or doer as well.

***Riley, the knowledge base for political updates and research updates.*** Riley grew up in a city, where one of her first memories was about the pollution in the city. Religion was and still continues to be a huge influence in her life. Ever since 6<sup>th</sup> grade, she was encouraged to read, and

it was something she really enjoyed. She also loved math, which made her minor in the subject in college. She also took to biology in college. While in college she joined some environmental groups and clubs. She graduated college in biology and took up a job at a research lab. Eventually, she also received a teaching credential. She however did not really enjoy teaching, as much as she did research.

Riley's love for reading and research comes through in the Green Squad. She is the one member in the group who has sent the most emails about studies, research, or happenings around relevant issues. She reads through multiple emails and articles that come her way, and she thoughtfully forwards them to relevant lists. Many members recognized Riley's ability to read a lot, focus on details, and skillful note-taking. Members also commended her for her research skills and nice demeanor. Members also pointed out Riley's interest and passion in local, state, and federal political affairs. While some of the members mentioned Riley's ability to research, they still seem to rely more on Adam to be the data guy. While Adam's expertise in research comes out during meetings, Riley prefers to share her knowledge through emails. While she mostly forwards important details, she rarely goes into the explanation of them in person. It is hard to say how deeply she studies the articles and research she comes across. She seems to be a member who covers the breadth of research whereas Adam goes into the depth of those specific research documents. During meetings, however, she presents herself also as a do-er, who is able to arrange for the town hall and take care of event setup details including making movie and/or speaker suggestions.

***Bridget, the knowledge base for spiritual activism.*** Bridget felt she led a sheltered life, but was exposed to the arts, concerts, and other educational things. She felt she had a happy childhood. She enjoyed math in school, and also art. She started off college with a focus in

architecture, but graduated with a degree in design in the fine arts. She spent most of her time during college focusing on getting an education. Just like her mother, she too enjoyed learning.

Bridget considers herself to be less religious and more spiritual. She used to be a part of church, but she soon realized her beliefs differed from those discussed at the church. According to her she has, “evolved quite a bit from [a] religious background. I don’t really attach myself to any *religion* now. I consider myself spiritual. I think *all* religions are foul. And no one particular religion has what we would [call] the insight track. That just-, that just doesn’t, it doesn’t fit. You know, (pause) my creator I refer to as Source. And, that’s the source for everybody. And he doesn’t care what-, he or she does not care what we call it. It’s how you live your life.”

Some members recognized Bridget’s contribution as being a good researcher. One of the members mentioned that Bridget prefers to do most of the grocery shopping for her home. The reason is that she is very passionate about the quality of food. She carefully reads labels to inform her choices. This suggests that she is interested in learning more about the health impacts and the information needs to buy good food. While it seems like she is well-informed on many issues, she is rarely vocal about them during meetings.

Many in the group struggled to identify her exact contribution, but a few members during interviews recognized her spiritual contribution. According to Bridget, her spiritual activism involves having a set of intentions and through a state of focused concentration, you repeat the words of the intention over and over, out loud too. The idea is to focus on the words, their meanings, and to have it come from one’s heart. And she believes that if more people did this spiritual, peaceful activism, it could also help on-going efforts of activism. Along with these spiritual practices, she also sends out emails from time to time about relevant issues for the

group. She is not too active with planning events, but she is an active member attending them, and is often interested in engaging speakers through her questions during the events.

*Phil, the knowledge base for group organizing.* Phil was a new member, who only attended one event and one meeting during the time of my study. He passionately cares about the environment, and has extensive experience in activism and organizing. Phil has always enjoyed the process of learning, but he felt it was not met during his school years. He wanted to know why they were learning what they were learning in school, and felt he did not really receive a satisfactory answer from his teachers. It was when he moved into an alternative school that he finally felt more comfortable to engage and learn. He enrolled in college eventually to study environmental studies. During this time, he experienced something that made him leave college mid-way to get more actively involved in environmental conservation. He said,

“I got so fascinated with the trajectory of Western culture and the history of European colonization in North America and the specific [issue of] how can people do such horrible things? You know, what, what allows that to happen on a cultural level? What justifies it for people? That was just a huge wakeup call for me to really challenge myself and the way that I grew up and also just the way I saw the world and history and everything. I was doing a report on deforestation and I was reading some books about deforestation and I found out statistics like: an area the size of Poland is cut every year. Stuff like that, just like crazy stuff and I was finding out that 200 species are going extinct every day and we’re in the middle of the largest mass extinction ever at the rate that it’s happening now. So I started learning about climate change. But then I had an opportunity to go-, instead of just writing these reports, I had an opportunity to go be involved in a campaign that was stopping logging.”

He has been involved in activism and organizing since then.

Phil continues to be an activist, but has according to him quieted down quite a bit. He said he went from feeling agitated when people would disagree with him to now realizing that people might know something that is different from his views/opinions, and he is open to learning and exchanging information.

Phil has gained, not only within the group, but also outside these groups a reputation for being very good at organizing. He is also known in the group for being the most tech-savvy one in the group. Members recognized that he was a serious activist with a calm demeanor and had an ability to conduct educational trainings and organizing.

***TMS & CM in the Green Squad.*** In this group, there are some members who bring specialist knowledge whereas others who bring in a generalist knowledge (Rulke & Galasiewicz, 2000). Adam's scientific and technical knowledge contribution seems to be a specialist knowledge contribution. While Riley has been recognized to be capable of taking on such research and understanding efforts, there haven't been enough opportunities for her to exercise this knowledge base in the group. She is able to exercise this knowledge base through emails, but has not exerted it during meetings more directly. Paige is also able to provide a specialist knowledge base on media-related aspects. While Vanessa, Riley, and Bridget have tried to write press releases, they still seem to have relied on Paige to make the final decisions in this area. Vanessa, Bridget, Charles, and Riley, seem to exercise generalist knowledge. Vanessa, Riley, and Charles seem to be the individuals who make the events happen by taking care of logistical issues. Riley is active in event planning and setup by usually making sure the town hall is available. Charles is often there to help setup and clean up after, and is also responsible for making sure that their event does not conflict with other events in towns. Vanessa is often

involved in distributing the flyers and spreading the word to different groups and individuals in the community. Both Riley and Vanessa have in the past recommended event ideas too. Bridget, along with Riley, is involved in keeping the group informed through emails. Phil, a potential new member of group, has built a reputation through his previous experiences with members of the group as being an expert in organizing. His lack of presence during meetings and events has not allowed the group to integrate his knowledge into the group.

Li and Huang (2013) found that groups that are mixed, i.e., have members who are specialists and also generalists, are able to perform best in comparison to groups that are all specialists or all generalists. This group can be said to have a mixed group with a TMS in place. While most members are clear on each other's expertise or contribution, there are some whose contribution remains unclear to other members or some whose contribution is not realized or exercised. As Yoo and Kanawattanachai (2001) point out, having a TMS does not necessarily translate into a CM. Not everyone's contribution in this group has been integrated into a CM. There are a few members whose expertise could be better applied to establish a stronger CM. For example, there is one group member besides Adam who has an ability to conduct and comprehend research, another whose contributions through emails, and another whose contribution through more active participation could contribute to a better CM for this group. These potential contributions could be further nurtured in this group in order to create a better CM.

As discussed above, communication among members in groups is needed to develop a working TMS. As Hollingshead and Brandon (2003) discussed, communication facilitates the development of TMS and is essential in the initial phases of the group. While I did not start studying this group from their initial stages of development, it is clear that there is some

difficulty around communication that could be preventing them from developing a stronger TMS. For example, I noticed one member rarely communicates extensively during the meetings. In two instances, it so happened that every time she had a question, a specific member in the group would interrupt or not address her question immediately. While the member did speak up to ensure her voice was heard; it was nevertheless somewhat of a struggle. There seems however to be some unresolved tension between a few members in this group. This could be stifling some members' abilities to contribute in the group during meetings. Upon checking in with one of the members however, they assured me that they do not let such tensions be unresolved for too long and practice letting go of them. This practice seems to be geared towards resolving the tension for themselves through internal reflection, but was not about engaging directly with the member in concern to resolve a communication issue. In another instance, a member's point was shot down with a more accusatory tone. The member did not directly respond to the criticizing individual during the meeting. They however at a later point mentioned how someone needed to let this other member know that they aren't always right and might need to listen to other members from time to time. In other instances, a member mentioned several times having some unresolved tension with at least one member in the group, but mentioned having conversations to resolve the hurt they felt in some interactions. Another member, although was able to express their idea for the group with me individually, but never felt comfortable enough to bring the idea up with others in the group during meetings. They also mentioned not feeling totally comfortable in expressing themselves.

In all these instances, it is clear that members were not always able to communicate directly or in an uncensored manner with each other. As Lewis (2004) found, face-to-face interactions have the capacity to build strong TMS within groups. The Green Squad then has the

capacity to exercise a stronger TMS. In addition, as Pelled (1996) mentioned, groups that have high familiarity with each other are more likely to engage in relationship conflicts. Pelled (1996) found that when a relationship conflict arises in a group, members become unwilling to listen and comprehend their rival's comments, and also ultimately choose to discredit their knowledgeable contributions to the group. As a result, the overall TMS of the group gets distorted. If the members in the group do not start un-censoring their issues with an intention to reach resolutions, then there are increased chances of the existing TMS in this group becoming distorted.

As Hutchins (1990) discussed, groups also need some overlapping of knowledge bases in order to be robust and flexible. As of now, Adam is the only member who is able to perform the scientific and technical expertise for the group. In order for the group to become more robust and flexible, Riley, Bridget, or another member could become more involved in order to help grow the scientific and technical expertise knowledge base for the group. As of now, if Adam were to leave the group, the contributions he makes towards the group would be greatly missed.

**TMS & CM in Nature Protectors.** Adam, Paige, and Vanessa, from the Green Squad, also belong to the Nature Protectors. Their roles remained the same in both groups. The remaining members of the group include: Devin, Linda, Martin, and Robert.

*Devin, the knowledge base of activist groups, experience with activism, enquirer/reporter, and leader.* Devin was a soldier, considers himself a feminist, and has been an activist concerned about women's rights and environmental issues for several years now. According to members in Nature Protectors, Devin brings his wide range of experience and knowledge with activism, democracy school, and politics to the group. Linda mentions his "world of knowledge on a number of different activist campaigns" and similarly Martin

mentions that he is a “font of knowledge” when it comes to activism due to his long associations with activism and multiple activist groups. Members also acknowledge that in addition to his expertise on activism, Devin is also a leader for this group. During meetings, this is also obvious. He is often the person who facilitates the meetings in order to keep everyone on track with the agenda items. Vanessa also mentioned how she finds herself being more vocal in Nature Protectors, due to Devin’s ability to ensure speaking time is given to members in the group. During every meeting, it is also very clear that he is often asking many questions. His questions often help better understand the presenting member’s points. In the first meeting, his questions were sometimes about reports and updates from other members on logistical functions such as previous meeting notes, treasurer’s reports, or other campaign reports. The other times, his questions included asking about specific technical details – for example, questions about the name and nature of chemicals or to further elaborate on processes of decision-making/ meetings/ regulations. Along with asking questions, he is also quite adept at providing updates on various activist campaigns occurring through the state.

***Linda, the knowledge base of research and technology.*** Linda graduated with a Bachelors degree in South Asian philosophy and religion. She went onto get her Masters degree in Biology Education and now works as a science teacher. All the core members of Nature Protectors, all the core members spoke of Linda, the science teacher, as being good with checking facts and with doing background research. Martin added that Linda also brings a sense of humor that is much needed and appreciated in this line of work. During Linda’s interview, she mentioned her love for science. During meetings too, it was evident that she would be the member to bring out her iPad to provide the necessary scientific or technical information needed.

Linda does take on the role of presenting background or factual information necessary for the group.

***Martin, the knowledge base of peaceful non-violent civil disobedience.*** Martin received a doctoral degree, and upon retiring from his professional career, he turned to activism more strongly. In the group, Martin is known to be a gentle guy and most of them attributed this quality to his career as a counselor. Martin is also greatly involved in a peaceful civil disobedience movement. For him, peaceful civil disobedience is a form of activism that can inform and move individuals in a movement. He believes that being involved in such movements can help “galvanize” the community. Becoming involved in such movements, according to him, allows people to start taking direct action toward taking care of their community and to get involved in the “renewable energy revolution.”

***Bob, the knowledge base of graphic design and media production.*** All members in Nature Protectors recognize Bob for his creative mind, his artistic abilities, and his expertise in making signs and movies/videos. He not only records public meetings and events, but also makes movies and also takes extensive measures to capture pictures while riding airplanes. In one of the meetings, he describes his experience of taking photos while traveling in a plane flying above an industrial site.

***TMS & CM in the Nature Protectors.*** According to Li and Huang (2013) groups that are mixed with generalists and specialists perform better than groups with all specialists or all generalists. While Nature Protectors can be termed a mixed group, there are more specialists than generalists in them (Rulke & Galasiewicz, 2000). While Bob contributes through his artistic skills, Martin contributes through his knowledge on civil disobedience, Devin through his long history on activism and his knowledge of other activist groups in the community, and Paige

through her media abilities and access. Vanessa is a relatively newer addition to this group, and so her knowledge base has not been well established in this group yet, so she could be called a generalist. There are at least three other members in this group, who were not part of the core group and were not participants in this study, who also could be classified as generalists. Linda and Adam are both bringing their specialist abilities to conduct research and comprehend scientific and technical documents. As Hutchins (1990) mentioned, groups with some overlapping knowledge bases are robust and flexible. This feature then, of having at least two specialists who are able to bring scientific and technical understanding to Nature Protectors is what makes this group relatively more flexible and robust compared to the Green Squad in that specific area, given their interests in a controversial scientific issue like hydraulic fracturing.

According to Hood (2014), smaller groups are more intimately connected to each other and hence were more likely to experience relationship-based conflict, whereas larger groups were more likely to have task-related conflicts. He found that conflicts in general decreased the group's performance. The members of Nature Protectors are geographically scattered, and meet once a month. In comparison to the members in the Green Squad, who are more likely to run into each other due to their close proximal distances, members of Nature Protectors seem less intimate, spatially. Geography is not a good measure for intimacy; however, I noticed that members in the group rarely mentioned meeting up with one another. Members of the Green Squad, due to the regular event schedule, were also more in contact with each other. Members of the Nature Protectors seemed to meet up mostly during their monthly meetings. Unlike the Green Squad, members of Nature Protectors did not seem to experience the same level of closeness. This could be one of the reasons why there was little indication of tension between the members of Nature Protectors. This could be contributing well to the TMS of this group, given how

conflicts affect performance. It is also important to acknowledge here that I studied the Green Squad for a much longer time than the Nature Protectors. It is very well possible that the underlying conflicts or issues did not surface during my analysis of their group.

**Comparing TMS & CM in the two groups.** The three overlapping members – Adam, Paige, and Vanessa – seemed to exercise the same role or stick with the same identity in both groups. Adam continued to be the technical and data member, Paige stuck to her media expertise, and Vanessa seemed to be bringing her generalist approach to this group as well. However, both Adam and Paige took up more speaking time in meetings they attended of the Green Squad than in meetings they attended of the Nature Protectors. More specifically, in the meetings of the Green Squad, when Adam raised a scientific and technical discussion, few members raised questions. In meetings of the Nature Protectors, members got engaged through raising questions.

While knowing scientific or technical details is only one aspect of the overall knowledge of any controversial issue, Nature Protectors in comparison to the Green Squad comes across as a relatively stronger and more flexible group in their capabilities with data analysis and comprehension. With respect to having generalist knowledge versus specialist knowledge, there seem to be more scientific and technical specialists in Nature Protectors than the Green Squad. Green Squad seems to be more of a mixture of specialists and generalists than the Nature Protectors. The two groups are also different in their nature: the Green Squad is a more local activist group focusing on issues in their local areas whereas the Nature Protectors are a coalition with members belonging to various other activist groups across a portion of the state with a focus on keeping each other updated and strategizing together for each other's issues. The nature of TMS in the Green Squad is geared towards education and putting up educational events – and for the purpose of event organizing, this group has enough mixture of specialist and generalist

contributions. For Nature Protectors and their purpose, they each need to be more specialist in nature and do bring those contributions to the group. They also portray having relatively fewer relationship conflicts in the group, which has helped them nurture a stronger TMS and CM.

### ***Conclusion***

In this chapter, I reviewed literature on TMS and CM. I presented results of TMS and CM in the Green Squad and the Nature Protectors, individually and in comparison. I used the literature review to analyze the findings presented. Overall, it can be said both groups utilized TMS, but the nature of their relationships affected their internal communication which in turn produced different CMs.

## CHAPTER 4

### DEFICIT-DIALOGUE MODELS OF COMMUNICATION

This chapter first presents a theoretical discussion of the two often discussed models of science communication – deficit and dialogue. The chapter then proceeds to discuss the models in the context of the Green Squad and the Nature Protectors. The interesting finding in this chapter is how activists are tied to aspects of the deficit model of communication, instead of pursuing a more dialogic approach that emphasizes building stronger relationships, which has been known to increase recruitment for social movements. The chapter provides an inside look into their reasons for implementing and the impact of their current approaches to communication in their social movements.

#### *Theoretical Discussion*

The deficit model of communication is a top-down transfer approach that is based in the notion that providing individuals with information or knowledge can alter their views. The dialogue model of communication is an iterative two-way communication process wherein knowledge is exchanged among individuals and meaning is co-produced (Bucchi, 2008). A core concept to consider for both deficit and dialogue models of science communication is knowledge or scientific and technical (from here on referred to simply as “scientific”) literacy, or the elimination of scientific ignorance. According to Firestein (2012), there are two types of ignorance: one, which involves willfully ignoring facts and logic, and two, which is a lack of understanding or clarity on scientific issues. There is a strong urge among many scientists, decision-makers, and governments to eliminate both these types of scientific ignorance and improve scientific literacy across nations.

**The need for a scientifically literate public.** The significance of scientific literacy was discussed in a 1985 report by the Royal Society, in which researchers provided recommendations to improve scientific literacy through formal education, mass media, museums, industry, and scientific communities. Efforts to improve science literacy have only been rising. One such example is Project 2061, which is an American Association for the Advancement of Science (AAAS) initiative that is driven to make Americans become literate in science, technology, and mathematics. Why is there a drive to raise science literacy among publics? Literature has presented us with at least three reasons to nurture efforts to increase science literacy among publics.

One of the reasons is that increased levels of scientific literacy have been found to be correlated to high levels of support for science. In other words, it is the notion that “to know science is to love it” (Pearson, 2005). Many studies have found that education and public confidence in and support for science are correlated (National Science Board, 1996, 1998; Miller, 1983, 2004; Pion and Lipsey, 1981; Etzioni and Nunn, 1974). More recently, the *Science and Engineering Indicators of 2014* (National Science Board, 2014) found a positive correlation between formal education and understanding, support, and a desire to engage with science. Allum and colleagues (2008) took on the task of conducting a meta-analysis of such similar studies to further explore this correlation. They analyzed 193 surveys across 40 countries carried out since 1989. They found that there was a small, but positive and consistent, correlation between knowledge and general support for science. They state that, “those scholars who...[believe that knowledge does not matter] will no doubt want to focus on the low magnitude of the overall effect. Those who believe that ‘knowledge matters’ will likely emphasize the robustness of the relationship— over so many national contexts and over time” (p.

51). They purposefully refrain from making any causal connections because they were unable to determine if scientifically literate publics were more driven to love science or if it was the love for science that drove these public to become more scientifically literate. Additionally, having a positive attitude towards science does not necessarily suggest scientifically literate publics either (Ahteensuu, 2012). And Bak (2001) and others (Evans & Durant 1995; Ziman, 1991) have found that the correlation between knowing and support for general science does not necessarily extend to controversial sciences. Overall, there is some positive relationship between knowing science and support for general science. Its causes and directions have not been firmly established.

Shen (1975) said that science literacy consisted of three components: practical literacy, civic literacy, and cultural literacy. Practical literacy entails having a scientific understanding that can help address practical needs of an individual around food, health, and shelter. Civic literacy involves knowing science in order to engage in public dialogue and participate in policy-making and decision-making on scientific issues. Cultural literacy is having the ability to appreciate and know science; one effect is enabling one to distinguish science from pseudoscience.

Civic literacy ties in closely to the second reason for the push to nurture more science literacy in many democratic nations, which is to have a public more engaged with science. According to Dietram Scheufele (2013), science is inherently political. Science, he says, has been tied to politics for a long time where scientists have worked in advisory roles for the government and the use of scientific and technological developments have needed to go through political regulations. Media has also played a role in either promoting or criticizing science while scientists have their reasons for wanting to engage with the media; in essence again science and media have a political relationship as well. One of the key point he makes, most relevant for this

discussion, is that the difference between “what science can do and what is ethically, legally, and socially acceptable” is often at the crux of scientific controversies. He then puts forth the question of how one can present science to publics that will resonate with them and allow for two-way engagement processes that will help address the ethical, legal, and social issues. We need to nurture scientific literacy, i.e., the civic scientific literacy that Shen (1975) describes, to have functioning and critical publics to question the societal and ethical implications of science. As Hails and Kinderlerer (2003) put it, people do not need an in-depth understanding of the science for them to access and have an opinion on its social and ethical implications. It is the questioning mind combined with some basic understanding that matters. In other words, having civic scientifically literate publics is a cornerstone for having engaged publics deliberate on science policies (Sturgis & Allum, 2004). Both science and politics need this exchange to grow. Shen’s (1975) cultural literacy contributes to a third reason for the drive to increase science literacy, enabling an individual to know and recognize science from pseudoscience. In a talk at the 2010 World Science Festival, Neil deGrasse Tyson stated,

“If you understand how the world works and what the limitations are, that are well-determined, scientifically, experimentally, then you can judge whether someone is trying to exploit your scientific ignorance. And the person exploiting you is not necessarily scientifically literate themselves. For example, they might have crystals they want to sell to you, and they will claim that it will cure you of your ailments.... I don’t require that in advance you understand the geological crystalline structure of Quartz.... What I would like for you to have is a way to ask questions about it.... [Asking them] ‘How do they work?’ ‘Why do they work?’ ‘Where did you get them?’ ‘How have you tested them?’ ‘What kind of ailments does it cure?’ ‘Is it better for some ailments than others?’ ‘Can

you cure something for me right now?’.... Science literacy empowers you. It inoculates you against charlatanism.”

This ability to be able to assess for features of good science by asking the right questions is another driving factor for nurturing scientifically literate publics. It has been found that knowledge is often consumed by individuals through various filters of values, ideologies, religious views, and trust in institutions and government, making the task of distinguishing good and not so good science more difficult (Goidel, Shields, & Peffley, 1997; Nisbet, 2005). This cultural scientific literacy might also be difficult to assess when the science in question itself remains controversial, i.e., when the questions of what is science and what is pseudoscience are still being debated in a field. Hydraulic fracturing presents such an example.

Overall, these all are acceptable reasons to work towards developing scientifically literate publics. The communication approaches that one takes towards helping improve this science literacy can be varied. There are two main approaches one can take to improve scientific literacy: the deficit model of communication and the dialogue model of communication.

**Deficit & Dialogue models of communication.** Athensuu (2012) said that for a long time, when the illness was seen as suffering from hostility and skepticism towards science, “the prescribed cure: science pills. Directions: swallow facts” (p. 298). This exchange sums up the deficit model of science communication. The deficit model of communication in the context of public communication of science is a one-way communication model that is driven to fill the deficit of knowledge among publics with an underlying assumption that knowing science will eliminate any skepticism or hostility towards it. As Bauer and colleagues (2007) put it, proponents of the deficit model of science communication have two main reasons for their push towards addressing the knowledge deficit. One, everyone needs to be scientifically literate as it is

one of the basic needs for people to function daily, and thus is similar to reading, writing, and counting. Two, in order to democratize science, we need publics who are knowledgeable about the political processes of science. However, as Wynne (1995) argues, besides these noble reasons for engaging in the deficit model of communication, there are other reasons for the perpetuation of this model. According to him, the deficit model of science communication also allows for the scientific community to maintain their authority and power over scientific issues (Schiele, 2008). This is in line with upholding Snow's (1974) image of scientists who have the knowledge on one side versus the lay individuals who do not have access or abilities to use this knowledge on the other side (Schiele, 2008). In addition, this model also neglects that knowledge is embedded in a socio-political environment, i.e., science and society are not two different entities, but rather are related with science embedded within society (Schiele, 2008).

The dialogue model of science communication began as a response to the critiques presented by the deficit model. The dialogue model of science communication refers to an approach of at least a two-way communication wherein individuals on all sides are willing to exchange their knowledge, open to reviewing their own understanding based on the dialogue, and prepared to co-create knowledge through social interactions during the engagements. It has been found that the deficit model of communication is a less preferred theoretical approach and has been recommended to be abandoned in favor of the dialogic model of communication (Einsiedel, 2007; Evans & Durant, 1995; Wynne, 1991; Ziman, 1991). Schiele (2008) provides a detailed history of the development of the deficit model of science communication starting following World War II.

The abandonment of the one-way, deficit model of communication has not been easy for many for some the reasons mentioned above (Schiele, 2008). A field that struggled with such

transition is public relations. For example, when Grunig (1984) proposed the dialogic model of communication, he was not met with immediate acceptance. According to Grunig (1984; 2001), there are four communication models: one-way press agency model which focuses on gaining publicity for an organization; one-way public information model that provides organizational news for distribution; two-way asymmetrical model, which gathers public opinion to persuade or garner support for an organization; and two-way symmetrical model, which is based on a symbiotic relationship between publics and organizations that through dialogue offers possible changes for organizations as well as publics to attain understanding and possibly agreement. While Grunig's (2001) two-way symmetrical model can seem to be an idealistic vision of communication, it can also be considered to be a normative model that organizations should aim to achieve but might not be able to practice in reality. It is important to recognize that Grunig's proposals were geared specifically towards organizations. For Miller (1989), the symmetrical model implied a lack of persuasion, which he felt was key for organizational communication. For Van der Meiden (1993), adopting the symmetrical model meant relinquishing self-interests of organizations. Grunig (2001), however, did not suggest a lack of persuasion or a total neglect of organizational self-interests, but instead suggested that through this model the organization while trying to satisfy their own needs should also be trying to help publics satisfy their needs. In other words, two-way symmetrical communication was similar to the mutual gains approach discussed by Susskind and Field (1996), which was also along the lines of integrative bargaining that was based on developing solutions that met all stakeholders' interests (at some level). This is also similar to Cissna and Anderson's (1994) understanding of dialogue as being not about winning or losing an argument, but more about nurturing a concern of self and others involved. Given this

chapter's focus, it would be helpful to conceptualize organizations as either scientific or government organizations dealing with scientific decisions.

Two-way, dialogic models of communication, especially symmetrical methods, have been known to provide multiple benefits to decision-making as well as to the decision-makers. Beierle and Cayford (2002) show through 239 case studies involving environmental decision-making that public engagement activities have the potential to be educational and to also resolve conflict and mistrust. Decisions made through these models exercise democracy and allow for fewer errors and more knowledgeable decisions (Fiorino, 1990; McComas, Besley, & Black, 2010). As Juanillo and Scherer (1995) explain, providing a dialectical environment can expose the true complexities of issues and provoke critical thinking towards evidence, which can lead to reaching better, informed decisions. There is research that supports the significant contributions that non-(formal)-experts or lay publics make to the deliberations (Brown, 1993; Epstein, 1996; Wynne, 1989). Coherent policy positions could be formulated through involving publics in democratic decision-making, which usually also leads to better acceptance and cooperation in implementing policies (Besley & McComas, 2005; Einsiedel et al., 2001; Juanillo & Scherer, 1995; Shrader-Frechette, 1985). Using two-way models, especially those that provide face-to-face communication, has also been known to increase sophistication that reduces ambiguity/uncertainty among participants around issues (Gastil & Dillard, 1999) and to promote future deliberation among participants (Burkhalter et al., 2002). While participants in activities that follow these models might have different expectations and intentions to participate (Webler & Tuler, 2006), they usually receive and/or accept decisions that seem to be developed through these fair, two-way, procedures (Besley & McComas, 2005; Fiorino, 1990). These two-way engagement models of communication have also become ritualistic in bringing communities

together, increasing cohesiveness, and reducing stress (Adams, 2004; Durkheim, 1912; McComas, Besley & Black, 2009; Knuf, 1993; Tarrow, 2011).

Heberlein (1976) quite early on recommended that organizations adopt two-way communication to inform, co-govern, meet legal requirements, and seek public input. Thompson (1970) especially indicated the need for citizens to engage in the co-production of governance procedures. Research has shown that there has been extensive work dedicated towards developing methods that prioritize deliberation (Halverson, 2006; McComas, Besley, & Black, 2009) and such emphasis on and interest in these procedures could have led to establishing a latent norm that organizations need to involve citizens in their decision-making process, or at least give an impression of it. In many instances, public involvement or engagement has become a mandatory requirement (Berry et al., 1997; McComas, 2003). Organizations might be restricted by lack of time and/or resources to provide citizen involvement multiple times and so might resort to having a meeting just to fulfill a mandate (Fiorino, 1990; Grunig, 1992). They might not have multiple meetings and instead might settle for giving the impressions of adopting a relatively shorter, one-time, process to make decisions (Webler & Tuler, 2000). While there might be organizations that are truly interested and willing to implement two-way communication amongst all stakeholders, there are other organizations that might want to appear to conduct dialogue only to fulfill a mandate (Grunig, 1992; Susskind & Field, 1996). In other words, organizations might only be faking to “appear fair” (Arvai, 2003; Besley & McComas, 2005).

According to Webler & Tuler (2000), “fairness refers to the opportunity for all interested or affected parties to assume any legitimate role in decision-making process” (p. 568). Why might organizations be putting such emphasis on (perceptions of) fairness? Public engagement,

public involvement, or any deliberation mechanisms are usually adopted in times of “multidimensionality,” “scientific uncertainty,” “value conflict and uncertainty,” “mistrust,” and “urgency” (Dietz & Stern, 1998). In other words, public involvement is considered apt during times of uncertainty and according to the fairness heuristic theory, procedural fairness is considered to be the most critical factor in decision-making during times of high uncertainty (Lind, Kulik, Ambrose, & Deverapark, 1993; Renn, Webler, & Wiedmann, 1995). As Besley and McComas (2005) stated, procedural justice is an utmost critical concern in public engagement. Thus, it might not be an absolutely terrible idea in at least attempting to be fair, but can faking it alone deliver?

In other words, is it sufficient to adapt these deficit models and fake fairness? Scholars have tried to understand the criteria and conditions of fairness of procedures, in other words, procedural justice (Besley & McComas, 2005). According to Leventhal and colleagues (1980), there are six criteria for procedural justice: “consistent application, lack of bias, availability and use of accurate information, ability to appeal and correct flawed decisions, ethicality, and representativeness” (Besley & McComas, 2005, p. 416). According to Webler and Tuler (2000), a fair process allows individuals participating in the process to freely attend, have access to information and its interpretations, use available resources to develop knowledge on the issue, initiate discussions, participate in those discussions, and also be able to have some influence in decision-making. Perceptions of the process matters in procedural justice (Besley & McComas, 2005) and perceptions of control and voice affect those perceptions of fairness (Besley & McComas, 2005; Latour, 1978; Thibaut & Walker, 1975). As Beierle and Cayford (2002) found, engagement methods are deemed successful when organizations embrace the communication with their participants, encourage quality arguments, and more importantly are given the

opportunity to control some aspects of the dialogue. It has been found that even if people choose not to exercise their influence, they would like to believe that they have the ability to exert that influence to affect collective decisions (Almond & Verba, 1963; Fiorino, 1990).

Webler and Tuler (2000) also make an important point that participants/stakeholders are comfortable with not having a “level playing field” (in Habermas’ terms), i.e., they see no harm in having the organization ultimately make a decision so long as the process of decision-making was perceived as being fair and as long as the individuals participating were treated with respect and were provided with a safe, open, and honest atmosphere for deliberation. The deficit model cannot allow for all of these conditions, because organizations that are defending are biased with their opinions, are usually unwilling to correct any flawed decisions, and undoubtedly lack an atmosphere that would nurture open, honest, and safe discussions during deliberations. With limited opportunities to participate, individuals in the deficit model are likely to experience the “frustrations effect” that could lead them to perceive the decision-making process to be unfair (Folger et al., 1979). Thus, while organizations might conduct these engagement activities to meet mandates, by using a deficit model of communication they are definitely not sending a message of engaging in a fair procedure, which affects public satisfaction with the decisions made (McComas, 2003; Webler & Tuler, 2000). If public satisfaction drops, research has long proven that it negatively impacts the desire for participants to engage in future events (Gouran, 1973).

The deficit model of communication has consequences. As discussed above, fairness of procedures has been known to be a powerful agent in determining the success of continued public involvement (Besley & McComas, 2005). Other reasons might include the overly technical presentations that sometimes produce disinterest in the issues being discussed

(McComas, 2003), but oftentimes this lack of awareness or interest is a sign of organizational deficiencies rather than individual limitations (Pateman, 1970; Fiorino, 1990). Organizations should aim to exercise two-way symmetrical communication in order to keep their stakeholders satisfied.

**Activism & deficit-dialogue.** According to Grunig and Hunt (1984), if a group faces problems and the organization fails to recognize or address them, then oftentimes members of those groups meet to figure out ways to get their demands met. The situational theory suggests that high problem recognition, low constraint recognition, and high level of involvement characterizes active publics, who often form and contribute to developing activist organizations (Grunig & Hunt, 1984).

Once formed and determined, instead of engaging with activists, organizations often again revert to adopting deficit models of communication or, worse, totally ignore the activists' appeals, because they view activists as threats or as problems and do not consider them to be crucial members (Gollner, 1984; Grunig, 1992). Symmetrical or dialogical communication can only operate when all stakeholders involved believe that they can learn from each other's perspectives (Juanillo & Scherer, 1995), but often organizations feel they have nothing to gain from listening to activists. Considering them as enemies or adversaries impedes any scope of authentic communication (Mouffe, 2000). One of Grunig's (1992) participants referred to activist group leaders as "nuts" and its members as being "crazies." Organizations are well known to either *stonewall* (remain quiet), *whitewash* (downplay worries), use a *smokescreen* (hide details), put up a *false front* (act concerned), *block and blame* (block themselves out by blaming another party), or *slash and burn* (go all out and fight) instead of acknowledging and engaging with angry/upset stakeholders – the activists (Susskind & Field, 1996). While

organizations might prefer to neglect these stakeholders, history is full of examples of activists like Julia Butterfly Hill (who saved the old California redwood trees) or Helen Steel and David Morris (from the case when McDonald's corporation sued activists, Steel and Morris, for producing a pamphlet critical of the corporation), or Tan Guocheng (for instigating labor unions protests in Eastern China) who despite being the "minority voice" were able to legally and economically rattle major organizations (Kim & Sriramesh, 2009; Tarrow, 2011). Many have also found that activism in the United States, especially related to interest groups, has been on a rise, especially since the 1990s (Dalton, 2006; Tarrow, 2011). Taken together, this research suggests that it can be in the best interest of organizations to recognize that activism and activist groups are a reality that need to be recognized, addressed, and possibly engaged with rather than neglected.

It can be gathered through this discussion that organizations using deficit models of communication are one of the factors that frustrate publics and could potentially lead them to become activists. One could then assume that as activists they might refrain from using deficit models of communication to further their cause. I however found that activists in my study, like corporate, government, and scientific organizations, also struggle to implement dialogic model of communication and are still for a lot of the time dependent on using the deficit model of communication for mobilization. In the next sections, I will discuss the relationship to education and the tension between deficit and dialogue models of communication observed in both the Green Squad and the Nature Protectors.

### ***Results***

In this section, I will first present results for the events organized by the Green Squad. The Nature Protectors were planning an event, but eventually cancelled it. Events were one of

the data points where the models of communication could be measured directly. I will then present each individual member's intentions with these events.

**Communication at events.** I attended six meetings with the Green Squad and three meetings with the Nature Protectors. The main agendas in the six meetings of the Green Squad was to organize educational events. They managed to host four events during the data collection period. The first two events were connected to hydraulic fracturing; the first more so than the second. The third event was not related to controversial sciences, but was on a controversial topic. The fourth event involved another controversial technology, GMOs, but had nothing to do with hydraulic fracturing.

The first event involved four speakers all focused on discussing an interactive fracking infrastructure map tracker for the state. The first speaker was from a nearby county, and presented on pipelines and compressor stations. The second and third speakers both reported on how their local community was fighting off a landfill expansion. The fourth speaker was a young undergraduate student activist who was presenting her experiences. There were computers on the side of the room for audience members to interact with the map project. Among the speakers, there was a discussion on scientific studies and also personal experiences. At the end of the presentations, audience members engaged in a Q&A session. The second event involved watching a movie related to income inequality, which was followed by two speakers presenting the proposed Trans-Pacific Partnership trade accord (commonly known as the TPP). There was also another Q&A session. It was the only event I attended where there was some questioning of the credibility of claims made by the speakers; an older white man stood up to call everything that was said that day and also about climate change to be "liberal garbage." The speaker responded, however the audience member did not seem too convinced by the speaker. The third

event involved two speakers, both women, who came in to present and answer questions on the Single Payer health care system. The fourth and final event during my data collection involved watching a movie on GMOs followed by a question and answer round with two speakers who were researchers present at the event.

Education was the main goal of all four events organized by the Green Squad. A second goal was to get people in the communities motivated, through education, to become more active in the movement. The Green Squad members expressed some frustrations along the way: not being able to have individuals attend events regularly, desiring a more active participation by younger people in the communities, not knowing how the event was perceived, and not knowing whether or not there was any education and/or action that took place following the event.

Every event began with either a movie or talks by speakers, and then there was a Q&A session. The communication approach in each of these events seemed alike. Mortimer and Scott (2003) laid out four possible communication approaches that could result from two dimensions during formal learning events (Table 1). The first dimension is that of dialogic or authoritative, and the second dimension is that of interactive or non-interactive communication approaches. In Table 1 the circles are concepts and the lines represent the presence of participation/discussion around concepts. In group 1, multiple concepts are being discussed through interaction among multiple participants. In group 2, there is only one concept introduced and everyone is interacting about that concept. For group 3, multiple concepts are introduced, but there is no discussion around those concepts. In group 4, a concept can be introduced and there can be absolutely no discussion/interaction surrounding it.

During the four events organized by the Green Squad, whether involving a movie or speakers, many concepts were introduced. During the Q&A session for these events, the

concepts were discussed together. This allowed for a dialogic-interactive communication approach. Mortimer and Scott (2003), however, suggested looking at these communication approaches in the context of overall communication patterns.

**Table 1: Communication approaches**

	<b>Dialogic</b>	<b>Authoritative</b>
<b>Interactive</b>	<p>Group 1: Many concepts &amp; interaction among participants</p> 	<p>Group 2: One concept and interaction among participants</p> 
<b>Non-interactive</b>	<p>Group 3: Many concepts and no interaction among participants</p> 	<p>Group 4: One concept and no interaction among participants</p> 

Although the interactions I observed at the Green Squad events did not match precisely the patterns identified by Mortimer and Scott, the basic principles they identified did help me categorize the interactions. Two types of patterns emerged. The first pattern is the triadic, which consists of Initiation-Response-Evaluation (I-R-E). The second pattern is the chain where a discourse contains an Initiation-Response-Feedback-Response-Feedback...(I-R-F-R-F...) continuing loop. Mortimer and Scott (2003), who were working in the context of formal education, said that traditional classrooms are reducing the practice of I-R-E patterns, where the teacher initiates a question, the student responds, and the teacher evaluates. According to them, the move is towards having the teacher initiate a more open question, allowing students to respond, and providing feedback in order to keep the conversation going amongst the teacher and students.

During the events, two types of patterns emerged. One of I-R, where an audience member would initiate a question (often asking for a clarification), and the speaker would provide an

answer. Evaluation was not really a part of this pattern, as it would usually involve a clarifying question that the speaker would answer and this would end the conversation. For example, consider an I-R interaction from the first event of the Green Squad.

I: Audience member: What's open season?

R: Speaker 1: It's an introduction to the pipeline for general people but mostly it's about getting companies to make commitments to buy gas out of the pipeline. So we'll talk about it more later.

Other conversations that also show the I-R pattern are those involving next steps or things to do. For example, consider the following conversation from event 2.

I: Paige: What do you want us to do on the action level?

R: Speaker 1: Organize. Talk to people. Get involved. Again you don't have to be left, you don't have to be right. This country is out of our control. It doesn't matter what your ideology is...the fat cats are in control. We have an...we are called a...Government of the wealthy. If we're going to take this country back ... check out." Take Back Our Republic." They're a conservative group calling for campaign finance reform. This is not a left wing-right wing issue. This is a democracy versus.... So... get informed. Contact [your town] and when that trade agreement hits, find out what you can about it and don't just... make phone calls...but organize people. Get involved. Get other people involved. Send out emails. Vote. Do everything you can to stop this TPP. It is fundamentally un-American.

The second pattern I observed was the I-R-F-R-F pattern, where an audience member would ask a question, the response was often from the speaker, but feedbacks came from either the speaker or audience members. Although the pattern of I-R-F-R-F was discussed by Mortimer

and Scott (2003), the initiator here is not the teacher or the speaker. Consider the following exchange from event 4, where audience member 1 initiates a question and the speaker and other audience members join in to respond and provide feedback.

I: Audience member 1: I have a comment and a question. My comment is that, if you are what you eat, why does the US rank 37th or 38th in the world in terms of health? My question is that, understanding that Monsanto got into the game early on, and wrote a lot of rules, these seeds that you have to purchase every year...is the reason that you have to do that because the second generation seeds are degraded and not as effective, or is it that because they really want to sell you more seeds.

R: Speaker 1: That's a really good question. I want to answer that. So. If the seed that you buy, bought are from a hybrid plant, meaning they got the seed from crossing two different plants together...then if you plant it out again then you'll have such a wide variety of things-

F: Audience member 1: No control...

R: Speaker 1: And farmers usually want things that are identical because if you're going to harvest, you want to know what you're getting yourself into. And so if it's hybrid, you really don't know and farmers don't want it. Well, you're also not allowed to if it's patented. The hybridization is one-

F: Speaker 2: The second is legal. We said that with a new plant, you'd have to buy it. GMOs so far are licensed as hybrids. Whether they start producing hybrids or...well it was basically they introduced hybrids so farmers stop reusing seeds.

R: Audience member 2: Plant a garden. I've been doing in for 27 years. People have porch gardens. Anyone can have a garden. And you prepare the seeds and you know they're your seeds.

F: Audience member 3: And you know that they are not contaminable. Everything else you're eating, you don't know the soil, corn, soy whatever else they mention...that was several years ago and now the numbers are higher, but if you're getting a Monsanto flyby, they can sue you and win for using their product. There was a case with seeds cross pollinated with a farmer's and Monsanto sued the farmer and won.

Except for the conversation from event 2 that was mentioned above, I never observed an instance where the speakers were challenged. It was indicative of how those who attended these events were already part of the *choir* and the events were almost *preaching to the choir*. Overall, the Green Squad organized events to raise awareness and educate its communities.

The patterns suggest that there was dialogue occurring at these events. While there was room for dialogue during these events, the dialogue for the most part seemed to be occurring only between individuals who already agree with each other. Dialogue and open communication between individuals who already agree with each other can be a learning experience with relatively easy flow of communication. Dialogue with those who disagree with you can be challenging, but also educational if there is openness to learning.

The events I observed seemed to be geared towards addressing the knowledge deficit. The events did not come across as being inviting to opposing sides of the issues. To understand this further, I gathered thoughts from each member about their intentions for these events and their relationship to deficit-dialogue models of communication. Were they only intending to raise awareness and educate their community members? Were they looking to get people to mobilize

through education? Were they looking to also dialogue with opposing individuals/groups, with an intention to learn more about their reasons for disagreeing with the group? These were some questions that I aimed to answer through interviews with each member.

**Member's views on Deficit-Dialogue.** Every individual member was asked about their thoughts on the events and their take on the educational focus of these events. While some were tied to a deficit approach, others felt a tension between adopting a deficit or dialogue approach. There was only one member who believed and wanted to adopt a totally dialogic approach. The presence of a deficit model of communication seemed more dominant than the dialogic approach. Even within the dialogic approach, members seemed to focus on clarifying questions or giving people space to express, but there was rarely a mention of learning from the other side about their concerns or reasons for disagreement. Each member's views on deficit and dialogue are presented below.

**Adam.** From his early experiences growing up, which was described in one of the previous chapters, it was quite evident that learning and gaining knowledge were a priority for Adam. A few years ago, Adam, along with Bridget and Riley, went door to door to talk about hydraulic fracturing. Adam said they approached about 880 registered village voters to sign a petition to ban or delay fracturing. They spent 3-4 hours each day for 6-7 days a week approaching voters with the 21 documents they prepared as part of their information packets. It can be gathered from the importance of this packet in his descriptions of the campaign that, for Adam, the key method to get people convinced about not allowing hydraulic fracturing in their village involved increasing knowledge or focusing on education. This seems to be a deficit approach of communication, where for Adam (and, as we will see, in this instance Bridget and

Riley, too), providing people with information and filling their deficit in knowledge was key to persuading them towards an anti-fracturing position.

It is also interesting to note that there was a lack of connection between Adam and his community members. He said that the community members at first did not recognize him or Bridget; but he also acknowledged that complete outsiders or those not from the community would not have had as much success as them being insiders. These thoughts suggest that he realizes that it was important for people in the community to interact with those from within the community. However, when I asked him about implementing a more dialogic model of communication where the Green Squad focused on building relationships with their communities before getting into discussing controversial issues, he did not seem too enthusiastic. He said he was not too optimistic about that approach and felt the community would not be receptive to it. Adam's behavior and his response to my questions seem to be telling of two competing beliefs. On the one hand, Adam believes that community members were more receptive to listening to insiders, and on the other hand, he did not think building a relationship with those community members would be beneficial. He seems uninterested in engaging in dialogic models of communication to establish a relationship, especially with those on the other side, to learn from each other. He seems to believe in continuing relevant educational efforts for the community members.

**Bridget.** Similar to Adam, Bridget seems to believe in focusing on education or increasing awareness among individuals in their communities. She said that she hopes, with every event, people are learning something and are able to improve their attitude towards helping the environment. She said, "knowledge is power and I have the optimistic attitude that people are going to learn things...from these events that'll improve their lives." For her these events were

about providing people with relevant information that was not being discussed in traditional media.

When asked about whether or not people are learning something new, she mentions having heard personally from some attendees about a few “ah-ha” moments. While Bridget’s evaluation seems to be based on what people report to her, there has been no effort from the group to evaluate if at all there is any learning and action taking place as a result of their events. She acknowledges that once people feel like they know enough, they are not inclined to make it to other events to learn more. It is unclear to me if some participants at these events conveyed that to her directly, or if this is an assumption. It is however clear again that for her the focus of these events is to provide education or increase knowledge about issues within the community. When asked about building relationships before engaging in a discussion or educational efforts related to controversial issues, Bridget also did not seem too excited about the opportunity. She was not sure if it would work or not. Based on her responses, it seems that she also leans more towards using a deficit model of communication. She has not ruled out dialogic models, and considers the Q&A sessions at the end of the events to be the dialogic component of their efforts. This understanding of dialogue, through the Q&A sessions, was echoed by some other members as well.

**Vanessa.** In one of the interviews, Vanessa talks thoroughly and passionately about how much she dislikes the way some activists frame their messaging and according to her “de-intellectualize” while communicating with publics. She acknowledges that this is something activists might do to explain to publics who are unfamiliar with science/technology terms, but it bothered her that the connotation of such communication was that it was dumbing it down. She remembers having “a visceral reaction” and she said, “if you're talking to people from this ivory

tower of academics and intellectuals, they're not going to want to hear us.” She continued on to say, “I don't have that attitude because I know too many people in [my community] who...all my neighbors who are well informed, well educated.” She went on to stress, “I don't think it really has to do [with] being dumb or unintelligent, it usually has to do with other things. So anyway, that bothered me but I think it's part of the bigger view. People want to, they want to educate and they want to reach people, but they refuse to see them as equals, you know? ...Or as intelligent even. So I just, I feel like some people want to kind of stay in an ivory tower...and look down.”

This was a striking conversation. As evident from her responses, it is clear that for Vanessa considering individuals in their communities as dumb or unintelligent does not seem appealing. For her, the goal is to provide information in order to let individuals make an informed decision. It is also interesting to note how she considers communicating from the “ivory tower” not the ideal method. As for the events, in another interview she said she wanted the “event to be something that really speaks to the community, not just the choir, so we need to get to the people.” She goes on to state later in that same interview, “another thing I’ve always thought about was the fact that the audiences we’ve brought our...the big audiences we’ve brought out was when we just invited people to come and.. learn about something and form their own decisions...and not tell them, ’come to this thing and we’re going to tell you how awful this is.”

While Vanessa disagreed with the deficit model, she did not elaborate on having a dialogic model of communication. When I asked her about taking such an approach, she seemed enthusiastic about it. It is also clear that unlike other members in the group, she seems to have better relationships with members of the community.

**Riley.** It was Riley, Vanessa, Charles, and Paige who did a lot of the planning and working for the events. For Riley, these events are “public information meetings” and also about

“community building.” Riley has positive feelings towards efforts involving building a sense of community. In addition to seeing these events as a place to build community, she also thinks organizing social events might help as well. She recollects a group in the past who had ice cream socials to bring people together, but she did not think they were successful. While Riley expresses interest in building a more connected community, she also seems to avoid communication with those having opposing views. Riley mentioned not being too keen on speaking with strangers in the community about anti-fracking efforts. She chose to approach people she already knew were for this cause. She said, “when we were doing the petitioning, I didn’t go to the houses of people I knew who were pro-fracking. I put them down as pro-fracking and I didn’t go to their house...haha.” Overall, Riley values dialogue, but she is also more comfortable engaging with those who are likely to agree with her rather than engaging with those who might be community members, but still strangers and could be oppositional.

Riley also describes her approach to communication as diplomatic and not antagonistic. According to her, “when you antagonize people they become defensive and then can be even more entrenched in their decision. I don’t think it works.” She goes on to state how she was quite taken by Dale Carnegie’s book, *How to Win Friends and Influence People*, which was first published in 1936. The book was designed to help, “get out of a mental rut, think new thoughts, acquire new visions, discover new ambitions,” “make friends quickly and easily,” “increase your popularity,” “win people to your way of thinking,” “increase your influence, your prestige, your ability to get things done,” “handle complaints, avoid arguments, keep your human contacts smooth and pleasant,” “become a better speaker, a more entertaining conversationalist,” and “arouse enthusiasm among your associates.” The book is divided into four parts: “fundamental techniques in handling people,” “ways to make people like you,” “how to win people to your

way of thinking,” and “how to change people without giving offense.” Based on the contents of this book, the focus here with communication seems to be about growing a strategic network. It seems that Riley has intentions or is at least preparing herself to interact with people through diplomatic approaches to “win” them over or to “influence” them. As mentioned above, however, she seems to prefer engaging in types of communication mostly with individuals who are in agreement or somewhat neutral, and not with those who are on the opposing side. In other words, Riley too is unwilling to engage in open dialogue with those of opposing views. She did mention having attended events that are of the opposing side to learn their perspective. She is however unwilling to hold a dialogue (even a diplomatic one) with those on the opposing side.

**Paige.** Paige is often one of the key members to bring in speakers for the events. At every event, she presents a brief introduction and proceeds to introducing the speakers. For her these events are all about providing information. She said, “I think we all recognize that the only thing that we could do that would really have any success would be to continue the door to door conversations, one on one conversations.... None of us has the stomach for it. ... I sure don't have the stomach for it. I don't like [some of these] people enough, I don't want to be...I don't want to have people chasing me out of their houses with their fucking guns.” It is clear from the exchange above that the events for her form a part of education. She does not feel connected to the community and also is not very excited to invest in either community or relationship building activities. She stated that her “philosophy is that we are way too freaking nice, way too bright and we need to be much more volatile and in the streets and stay there. And we stand there and act like this is a nice gesture, when a lot of people are bummed, but generosity should not be our motivation, our motivation should be to shut them down.”

One can say that Paige is participating in the group not so much to educate the community, but more so because of her interpersonal connections with the people in the group. Her philosophy certainly does not align with others in the group, and so she can at times feel stifled and frustrated. She also notices that many individuals who they initially recruited have not continued to stay involved.

She recognizes that the educational events alone are not enough to increase member recruitments. She states further that, “the hard work of going door to door, having conversations with people, several of us have already done that, we can’t go back to that, we’re not being creative enough. I think it’s largely that there’s not enough of us, I think I’m the only one under 70 in that group, except for [one specific person].” But, is door to door the only way to build relationships in the community? Phil had describes a creative approach, but the group did not receive it well and did not seem enthusiastic about it.

Overall, for Paige, education is important and necessary, but she does not see it as being the solution to getting more people involved. She also however does not like engaging with community members. Paige does not seem to subscribe to the deficit model, but she is also unwilling to participate in dialogic models of communication with her communities.

**Charles.** For Charles, the deficit model of communication seems more appealing. He described it during one of the interviews. When asked why we should focus on education or informing people, he said, “I guess my personal opinion, thinking about the group, is that the sense is that these issues are important...and maybe if people were better informed then they may act on that issue in some way that’s appropriate or expedient for them. I guess maybe just to stimulate people more into being actively engaged socially or politically....”

Charles sees that informing or educating people could motivate them towards various forms of actions. He gets frustrated with individuals who do not take advantage of these educational events. For example, during the first event I attended, the videographer packed up after recording less than 1/3<sup>rd</sup> of the event. The SD card in the video camera ran out of memory, so the videographer packed up the camera and left. Charles described his frustration over how this young man was not attending to take in information that was relevant to him.

Charles also gets frustrated with individuals who are unwilling to or those who refuse to see the “science.” He states, “How, how can this be? How can they be? They are smart people. But it’s almost like they don’t want. To. Believe. The science. They are more going on...I don’t know how? I don’t know the term for it. But they’re really going more on, not myths necessarily, but these assumptions about industry and technology that we can trust these guys because they know what they’re doing. When we know from the science that it’s just not safe. As [a well known researcher] has proven.” It is interesting to note how for Charles, there is an assumption that individuals in support of fracking are not looking at science or that they are basing their decisions on something other than science. Again, it indicates an attitude along the lines of: if only they knew the science, and not the myths, they would understand and become motivated to act. This is a classic deficit-model position. Charles seems frustrated when people are not open to learning the “science.” But, is he willing to explore those differing views more? Is he interested in knowing why people disagree? Or, what their perspective could be and how it could expand his views on an issue?

When asked about engaging with members in the community, Charles described himself and one of his closest friends: “I think that we really, we like people, but not a whole lot (laughs) Humans, you know, I’d much rather spend my time with snakes and lizards and birds and I just

prefer to be out in the country where it's quiet, but I know it's not healthy either." He goes onto say,

"And I guess I don't really feel like I care that much anymore of whether the people in [the village] are engaged in some of these things. I mean, I'll do what I can and I guess that's why I'm on the school board. I feel there are certain things I can do with my time where I feel my time can be, my decisions, the votes I take have a direct impact on children and teachers within the school and that's definitely a better use of my time."

For Charles, there seems to be a leaning towards educating individuals, but not so much towards engaging with people, especially those of opposing views. He is definitely frustrated with the opposing side, but is unwilling to engage in a dialogue with them.

**Martin.** When Martin discusses dialogue, he says that it is worthwhile engaging in a dialogue with certain groups of people, but not with everyone who is on the opposing side.

According to him,

"there are a number of people in the community that have opposite views. And it can come from many directions just like our defenders are fighting for many reasons, people who feel protective of industry and what not are fighting for many reasons too. 'I have a relative who works there' or something like that, right? "My ideology is for continued growth in the economy and what you're doing threatens that." OK. "Let's use our natural resources, that's what they're there for." OK. There's a lot of reasons people oppose me, or my ideology I should say. So, I think that the people who put themselves or end up on the fence, definitely worth while approaching those people individually or in groups. It's why we have educationals, trainings and what not. Our training isn't only to inform

people how to safely do civil disobedience, it's also an educational about [the movement] and what we're setting out to do...we've done over ninety of them.”

For Martin civil disobedience itself can be a form of education that could bring in more people interested in or even invested in the movement. However, he does not think that it is possible to engage in a dialogue with those in the extremely opposing sides. He gives an example of the workers whose livelihoods depend on an industrial plant. He recognizes that there will be some people his group he cannot dialogue with, but with those on the fence he seems to think there is room for dialogue. His discussion around trainings, where he mentions wanting to at least listen to a disagreeing voice, but not really willing to address it in any way seems indicative that he does not seem too interested in engaging in dialogue with the opposing side. He said that it is important to hear them out, because they are part of the community, but he does not seem to have any interest in learning more about or engaging more with these individuals. He says that he has not figured out how to engage with those having extremely opposing views from his.

Martin sees room for dialogue but only with those who are on the fence or in agreement with the movement goals. He seems to not know how to engage with individuals who are not on the same page as he is. Martin sees education, through peaceful civil disobedience and its related training, as being important in attracting more individuals towards the movement.

**Devin.** Devin, after college, got a master's degree in education. While he did not teach in schools, he had been involved in community-level teaching through democracy schools. For Devin, educating communities is important, however he does not seem to tie education necessarily to persuasion. He said, “I think the activist, my kind of activist, is the activist that brings the knowledge that is lacking on an issue where the activist community has found a problem with that community not responding in their appropriate way, to bring that information

and let the chips fall where they may. If the people aren't ready in that community to move, to effect the changes that are necessary then move on to other communities. But at least go through that one step of public education.”

For Devin, it is important to go through education at the very least before giving up on a community. It is interesting to note that Devin thinks that if the community is not interested, despite having given them the necessary knowledge on an issue, then the activists need to move on to other communities that might care about these issues. In other words, for Devin, if people do not care after gaining enough knowledge, then he would move on, and not dialogue to assess their reasons for apathy or opposition.

According to Devin, local communities of activists need to recognize that there is a problem, work on mobilizing their people, and then if there is enough justification hold education forums. For him, it is the local activist community that recognizes the issue and then organizes education to help increase awareness within the broader community, given that there is interest within their local community. For him, the drive needs to come from within members of the community and then education needs to follow. For Devin, education is important only if the community expresses interest in learning more about an issue. Devin also stresses that the speakers at educational events should include members from opposing sides. He also says that the tone of education should not be such that people are not “made out to be less than they could and should be” for not having the necessary knowledge. He also acknowledges that education takes time and recognizes that for many of these issues like climate change time is precious and there is a need to start taking immediate action. He says there is a “tension between rushing for getting adequate public support, education, and the problem of the issue itself” which is time sensitive.

For someone who thinks dialogue is essential, Devin believes that building relationships with community members can be hard. He says, “It’s tough to take that step and go out and know your neighbor better than you have known your neighbor all along, because in a way you’re having to admit that you’ve been part of the problem. So there’s a denial that goes along with that kind of question.”

I think it is important to note that Devin is discussing the activities of the Nature Protectors (which is a regional group that works with smaller local groups). I think he would still support efforts by the local activist groups to continue making efforts to raise awareness and create that interest among their community members. But for Nature Protectors’ involvement in organizing educational forums it is important that the local communities already feel motivated to engage. Nature Protectors as a group, according to him, would like to be a facilitator and not some outside “moral warrior” for any community.

Overall, Devin sees dialogue with individuals who are interested or curious about an issue as being important. He sees value in providing education to these interested members. He however does not seem eager to engage or hold dialogue with individuals who are not interested in the cause. He thinks his group could provide them with some education, but if the members do not seem interested, then Nature Protectors needs to move on.

**Linda.** Forums, for Linda, are an opportunity to engage in education and conversation. For Linda, education and dialogue are both important. She said that education is the “only way you can get the actual facts, the reality out...to the public. So that there aren’t these competing myths, because you’ve got the myths from the industry or the corporation and the misperceptions that the public has, either that have been translated from fears or part of these that are wired. And

this is a possibility for the presentation of scientific facts and conversation. It's a venue for questions and answers and education.”

One of the first reasons for focusing on education that Linda mentions is an opportunity to clarify between myths and facts for the public. She also stresses that people could have misconceptions based on the myths that (according to her) industry and corporations are conveying, from personal fears, or from some conditioning. She sees educational forums as opportunities to address these misconceptions through conversations.

Linda says that she thinks there is value in having conversations with those individuals who are on the opposing side. She uses an example of the workers who might be affected by industries, “because they’re actually being bullied by the company and they’re going to be the ones who are the real victims. But it’s way too late now and it...they’re so scared that they probably would never have come anyway.” I asked her about having an open dialogue or conversation with these individuals, and she said, “because the company has got them so terrified, but that’s true, it would be wonderful to have something where instead of having a big talk down forum, we could just have a meeting.” Two things strike me from her statement here: one, that she thinks there is value in engaging in a conversation with individuals who might be opposing, but also suffering. Two, she phrases educational forums to be “talk down” and associates having a meeting with a conversation. This is revealing, in that for her educational forums are a talk down, and she feels it is necessary to have some “talk down” along with a conversation during Q & A.

Upon asking her about relationship-building in communities, she seemed enthusiastic to work on it. She came across as being genuinely interested in nurturing relationships within communities. She said, “That would be cool, if we could get all these people on these topics. But

instead of having them all talk we could have them talk sitting at tables and having conversations.” She elaborated further saying, “That makes sense, because you can educate until you’re blue in the face but unless you’re getting the community in and making the community....It’s not going to stick unless they’re feeling connected and owning it and they’re a part of it.”

Linda came across as someone who was interested in building communities and engaging in dialogue with those on any side of the argument. She also placed importance on holding educational forums where knowledge could be discussed rather than “talked down” to the communities. However, she did seem concerned about being able to communicate scientific facts, and address the different myths conveyed (she said) by the industries. While, she comes across as someone who would like to engage in dialogue with members of the community, regardless of their side, she seems to firmly believe that her side or Nature Protector’s side was indeed the one communicating “science.” This shows that she discounts a lot of what comes from industry to be a myth. What, then, would this dialogue between her and opposing sides look like? Is there openness to her dialogue with those on the opposing side?

**Bob.** For Bob, education is important, but he also believes that it is insufficient. He said, “I think the Nature Protectors, their main mission is to first and foremost be an educator to the community. I told them this in a meeting, I said you can lead a horse to the water but you can’t make them drink.” He goes on to state, “you can tell people that there’s a problem in their community but unless they see it, why bother?” This is very much in line with Devin’s thought process, where he believes that it is essential to hold education forums for those who are interested to learn more about an issue. In other words, if a community does not see the problem, Bob does not see Nature Protectors being the group that will work on mobilization. He

elaborated, saying, “if somebody is drinking too much alcohol, you can tell them to back off but unless they realize they have a problem...you understand.” On the other hand, Bob also expressed frustration around providing information to people who are already on board.

Overall, for Bob, education seems to be important, but he wants to hold such forums only for those who are interested about learning these issues and are not yet on board. He does not see Nature Protectors actively working on creating that interest or concern within communities. He made no mention of investigating reasons for disengagement or concerns about people who are not yet motivated to act, and also offered no discussion around dialogue with them.

**Phil.** Phil is the only activist member who initiated and discussed dialogue approaches to communication. His aversion to the deficit model started early on during his schooling days. He expressed his frustration when teachers would treat him like an empty glass that was waiting to be filled. This analogy is applicable to describe the deficit model of communication. It was a long journey before he adopted this outlook to communication. He discussed his journey from being an arrogant activist who did not want to listen or mingle with those who were not on his side, to realizing that he did not enjoy judging people as much as he did learning about other viewpoints.

A few years ago, Phil became interested in popular education and group facilitation. He said, “what’s always kept me really empowered and optimistic is the kind of values of popular education, like lead to serve and your goal is to bring everybody up...you know, empower people around you and contribute to people’s self-empowerment, and all those things are so exciting to me. I’ve always been really into education and not education to fill an empty glass, but education to have a collaborative exchange.” For Phil then it is not so much about the actual knowledge, but more about the dialogical approach to sharing and learning that knowledge.

Phil's distaste for the deficit model of communication has been apparent in his reactions to events. One can also see that he came to dislike the didactic attitude that he felt was inherent in many activist cultures. His interest in wanting to interact and understand people also came across. He critiqued the second event organized by the Green Squad because he did not agree with the deficit model approach to communication, where he felt the audience members were forced to sit and take in information until the very end. He felt they were being talked at rather than talked to, which turned him off.

In an interview, he presented his idea for community building. He talked briefly about the "listening project" that he and a few of his friends organized. They would go from door to door, listening to people talk about their community, their views, and concerns. The goal was not to push an agenda but to simply listen to community members. He also expressed interest in starting his own monthly movie screenings titled "Know your Neighbors," where he would screen short documentaries on the wildlife present in their areas, with each event focusing on a different animal. He also wanted to make it a family-friendly event, including food and a craft corner or drawing books for children. His goal with these events was to build community relations, but also begin to nurture a community that would care about the environment and its issues. Then when they start to ask questions about becoming more involved around these issues, the Green Squad could become a place to begin. When I asked others in the group about Phil's idea, many did not seem excited about it. Vanessa and Linda were the only two members who seemed openly enthusiastic without any skepticism to try out this approach of relationship building within communities. Table 2 summarizes individual activists' take on approaches to communication, and whether or not they were more inclined towards deficit or dialogue forms of communication. Table 3 displays which members align on their communication approaches.

**Table 2: Activists & approaches to communication**

<b>Activist</b>	<b>Description of Approaches</b>	<b>Deficit/Dialogue</b>
Adam	Believes in conveying accurate and relevant technical details during communication; does not believe that relationship-building with community will help move their cause ahead	More deficit – Less dialogue
Paige	Values providing information and raising awareness in community, and not so interested in relationship-building with those in their community	More deficit – Less dialogue
Vanessa	Believes in providing information in order to let individuals make an informed decision; likes engaging with them as equals; interested in building relationships in community	Less deficit – More dialogue
Riley	Values providing information and also dialogue, but is also more comfortable engaging with those who are likely to agree or on board than those on the opposing side	More deficit – Less dialogue
Charles	Believes in focusing on education and increasing awareness; does not feel an affinity towards relationship-building with community members	More deficit – Less dialogue
Bridget	Believes in focusing on education and increasing awareness; does not believe that relationship-building with community will help move their cause ahead	More deficit – Less dialogue
Phil	Values dialogue; wants to build relationships and trust with community members to better understand them; still interested in engaging with people to learn from them, regardless of their position on the issue	Less deficit – More dialogue
Devin	Values dialogue with individuals who are interested or curious about an issue, and not with those on the opposing side; recognizes it can be hard to dialogue with the opposing side; considers it important to provide education to these interested members	Somewhat more deficit – somewhat less dialogue
Linda	Interested in building communities and engaging in dialogue with those on any side of the argument; values providing education that does not talk down at people attending	Somewhat less deficit – Somewhat more dialogue
Bob	Sees education as being important, but considers it important for the interest/curiosity to come from individuals in the community	Somewhat less deficit – Somewhat more dialogue
Martin	Considers worthwhile to engage in a dialogue with certain groups of people, but not with everyone who is on the opposing side; values raising awareness	More deficit – Less dialogue

**Table 3: Distribution of approaches**

<b>Deficit Approach</b>		<b>Dialogue Approach</b>	
Adam	Devin	Linda	Phil
Bridget		Bob	Vanessa
Paige			
Charles			
Riley			
Martin			

***Conclusion***

Not all activists in the Green Squad or the Nature Protectors seem overtly tied to the deficit model. There is some interest in building relationship and engaging in dialogue with their community members. It is however evident that for many, they are only interested in engaging in dialogue with those who are either interested, on the fence, or in agreement with these groups. Even their engagement often takes place only at the end of the events where there is a Q&A session. There also seems to be a tendency towards thinking in very black and white terms with respect to what counts as knowledge. This will be further explored in the next chapter, but this often is a motivation for many activists in these groups to hold events. They want their community members to make an informed decision with the “right” type of knowledge, and these events for them are ways to achieve that goal. The approach is similar to a deficit model, which is based on a belief that knowing will fix everything. The Q&A session has the potential to become more of a dialogue, but during my observations the sessions often did not reach that full potential. People attending the events also seemed to be on board or maybe on the fence, but very rarely were in disagreement with the group’s agenda. It could be that those who had opposing views never voiced their disagreement. It is also evident that many individuals in the activist groups are not thrilled about building relationships with members in their community.

They either seem to detest or be apathetic towards their community members. Overall, these activists are keen on educating and raising awareness in their communities, but are unwilling to work on relationship-building or getting involved in dialogue with those who might be undecided or have opposing views from them.

## CHAPTER 5

### ASSESSING CREDIBILITY

Although efforts are being made to appreciate and include lay knowledge into the scientific enterprise, some would argue that scientific knowledge produced by experts (as in those belonging to academic, industry, or government research and development positions) is still considered to be more credible in certain situations (Collins & Evans, 2002). This chapter begins by presenting a brief review of the value we place on scientific credibility and the ways activists think about credibility of scientific knowledge. The chapter then outlines the criteria of credibility used by activists in the Green Squad and the Nature Protectors. The chapter concludes by discussing the potential role these criteria have on individual science learning.

#### *Theoretical Discussion*

A theoretical discussion of the value of scientific credibility and the relationship activists have with scientific credibility is provided below. This is not exhaustive, but rather a brief discussion of these topics.

**Value of scientific credibility.** Very few would argue against the idea that we value professional expert opinions because we consider them to be credible sources. When it comes to making decisions, whether in court cases or about medical procedures, we rely on scientific expert opinion to present credible information. More recently, however, scholars have begun questioning the criteria for expertise: who can be an expert? There have been increasing efforts to study the type of expertise offered not only by scientists or scholars, but also by lay individuals. Some of the prominent cases that illustrate the need and power of involving lay individuals or lay expertise include: Brian Wynne's (1992) studies of the Cumbrian sheep

farmers displaying knowledge of sheep grazing patterns and their relation to risk assessments, Phil Brown's (1993) account of the residents of Woburn Massachusetts taking on popular epidemiology, and more recently Gwen Ottinger's (2013) work on the abilities of community members in Louisiana to conduct scientific research and push for changes from an oil refinery. Gwen Ottinger's (2013) study reveals the potential of lay knowledge, but it also displays the power in the concept of "professional expertise." She found that the residents were able to reach a settlement with the oil refinery, but their health concerns were never met. The industry was able to convince the community members that the oil refinery was filled with responsible and caring experts who wanted to do the best they could to address the situation. Community members then found it difficult to challenge the professionals' expertise. On some level, although the community members displayed expertise, they were unable to challenge the more formalized scientific expertise. The claims and evidence provided by the scientists or academics were in the end deemed to be more credible.

The image often portrayed is that lay publics or those outside the scientific community are unable to comprehend science and make rational decisions (Martin, 1989; Scott, 1988; Scott et al, 1990). Brian Wynne (1992) described this as the "arrogance theory" that many scientists seem to experience. In Wynne's (1992) study, scientists investigating communities near the Sellafield (UK) nuclear plant decided to treat for high levels of Caesium in soil and vegetation by spreading the mineral bentonite at different concentrations on fenced in fell lands and requested farmers to have their sheep graze in those areas. While the farmers complied, they also insisted that the sheep would only graze on large, open, fields of fell-side with no fences. The scientists decided to pay no heed to their advice. Interestingly, the experiment was reportedly abandoned later for the same reasons the farmers had identified. The farmers reported that scientists came

across as being arrogant for not having taken their knowledge into consideration, untrustworthy due to the multiple failed scientific attempts, and also less credible for their lack of transparency.

The scientific community has begun to recognize the possible contributions lay knowledge can make towards developing more credible and well-rounded work. The scientific community has started opening their laboratories to more lay involvement through efforts such as midstream modulation (Fisher, 2007; Schaubiers, 2011) and also through various types of citizen science projects (Bonney et al., 2009, 2014). This inclusion of lay knowledge and public participation in science, however, has not been met with complete acceptance. Collins and Evans (2002) discuss the “problem of extension” or the amount to which there needs to be an expansion in expertise. In their article, Collins and Evans describe three waves of science studies. They identify the 1950s and 1960s as an era where top-down science communication from scientists to publics was considered the norm. No one questioned the authority of science until the late 1960s. During wave one, science was considered to be “esoteric” and “core scientists” were considered to be the trusted experts. Wave two for them is still continuing to some extent, where the boundaries between scientists and lay people are broken down, and both scientific expertise and lay knowledge are considered during decision-making. Science in wave two is portrayed as a social construction where the notion of expertise is no longer concentrated solely within defined scientific institutions. Wave three, as they put it, does not replace wave two of science studies. Wave two for them deals with issues concerning scientific consensus, whereas wave three for them deals with issues of how scientifically informed decisions are made in times where there is not an absolute scientific consensus. In wave three, they propose the restoration of scientific expertise, and call to restore in some instances where this expertise is valued and is considered more legitimate. They categorize different types of expertise: contributory expertise involving

the authority to contribute directly through their research to the field of science, interactional expertise involving the ability to interact with those having contributory expertise, and no expertise. They also include the abilities to translate their expertise to other experts, and also the ability to discriminate between credible and spurious claims. Overall, Collins and Evans seem cautious about extending authority to those without scientific expertise.

Whether we should embrace or promote this third wave was questioned by Sheila Jassanoff (2003). She argued that the issue is not about whether we need to rely more on scientific expert advice or continue with more democratic decision-making processes, but to strive for both. She does not agree with the dichotomy that Collins and Evans put forth in their paper. As she described it, “the question is how to integrate the two in disparate contexts so as to achieve a humane and reasoned balance between power and knowledge, between deliberation and analysis” (p. 398).

While there are multiple types of knowledge that are being appreciated and sometimes incorporated, we still privilege traditional or more formally constructed scientific knowledge over lay knowledge. Privileging scientific knowledge does not suggest that we ignore lay knowledge, but there is a tendency during decision-making to place scientific knowledge on a higher pedestal. During controversies, proponents and opponents seek support for their claims through scientific authority. Scientific experts are often considered credible sources, because they are claimed to possess high knowledge, strong evidence, and low uncertainty (Campbell, 1985). According to Mulkay (1979), scientific experts are considered “carriers of certified knowledge” (Campbell, 1985, p. 430) and Collins and Evans (2002) call for acknowledging the value those certifications bring to decision-making without disregarding the information brought by lay publics who possess “experience-based expertise” (p. 238).

According to Collins and Evans (2002), there are three levels of expertise: contributory, interactional, and no expertise. Contributory expertise is to exercise “enough expertise to contribute to the science of the field being analyzed,” interactional expertise is to possess “enough expertise to interact interestingly with [scientists] and carry out a sociological analysis,” and no expertise exemplifies “insufficient [expertise] to conduct a sociological analysis or do a quasi-participatory fieldwork” (Collins & Evans, 2002, p. 254). According to these scholars, the “core-set” of scientists primarily have the expertise to make any contributions to the science of the field and scholars studying these scientists. Again through these classifications (which are continually debated amongst STS scholars), it is evident that expertise, whether contributory or interactional, involving scientists or lay, is based on the abilities to comprehend and communicate in scientific terms. Scientific knowledge, again, takes precedence. I argue that concerned citizens or activists could gain interactional expertise through immersing themselves in scientific lingo. In other words, interactional experts can talk the talk from their linguistic immersion in scientific dialogue and contributory experts can walk the talk due to their practical immersion in the scientific culture (Collins, 2004).

**Activists and science credibility.** This privilege assigned to (carriers of) scientific knowledge can also be a reason for lay individuals, especially activists, to (un)intentionally gain “interactional expertise” or become more familiar with the science of their controversial cause. Often activists, based on their experiential observations, engage in scientific research less by themselves and more through external consultants to test their hypotheses. Interestingly, in the process, these activists learn about the underlying science of their interested issues (Brown, 1993; Lezaun, 2011).

For example, Alastair Iles (2004) found that local activists and the National Resources Defense Council collaborated with the Dow chemical plant in Midland, Michigan, to identify pollution prevention options. Dow chemicals managers met directly with activists, who kept themselves informed in the relevant science and technology of chemical engineering, toxicology, pollution measures, and plant operations. Two technical consultants were each assigned to work with the company and activists. The activists entered discussions with the company, presenting their ability to comprehend and converse with company managers and also their capacity to combine this technical knowledge with their local expertise. The results of this collaboration included the decision to reduce use of 26 priority chemicals by 35% in two years. In this case and also in another similar case in Channelview, Texas, activists demonstrated their abilities to comprehend and challenge scientific arguments through becoming familiar with the language of science. In another example, Phil Brown (1993) found that lay individuals or local activists in Woburn, Massachusetts, became “popular epidemiologists” through engaging in scientific investigations aimed to detect environmental hazards and diseases caused from a toxic waste site in their community. One of Lezaun’s (2011) participants, Haefeker, also “confessed that in the years he has spent lobbying on behalf of beekeepers at European institutions he has had to learn a great deal about farming systems, genetic modification, and agronomy, but that above all else, he has learned an enormous amount of ‘political science’” (p. 752). In all these studies, the lay individuals, or activists in some instances, were the ones to learn more “science” and not the scientists learning something from other stakeholder.

Collins and Evans (2002) would even say that scientific immersion is a requirement for those seeking to interact with scientists. It should be mentioned that Collins and Evans only coined the term “interactional expertise” for those STS researchers who grasp scientific dialect in

the process of studying scientists. Collins and Evans would agree that having interactional expertise is definitely a benefit to better communicate with scientists. While lay individuals might be able to gain entry into decision-making through their lay knowledge, their ability to sustain their decision-making influence would rely heavily on their scientific interactional abilities (Collins & Evans, 2004; Iles, 2004).

There is however an additional barrier to lay individuals gaining scientific knowledge or parlance. Activists are often criticized for not getting their science right or that their understanding is not based on “genuine science” but rather on popularized versions of it (Hilgartner, 1990; Lewenstein, 1995). The assumption is that when genuine science is popularized or disseminated through media, the genuineness of science is lost. Journalists and publics are considered to be easy targets and promoters of “polluted” popular science (Hilgartner, 1990). Activists are sometimes called “popular scientists” or are labeled “antiscientific” (Brown, 1993; Freudenberg, 1984). According to Collins and Evans (2002), scientists outside the “core-set” also could be blamed for relying heavily on popular sources. Nevertheless, often times it is the lay public or media that bear the brunt of the accusation of getting their science wrong. Hilgartner (1990) investigated the dominant view of popularized science, which is often described as a two-stage model where first, scientists develop “genuine knowledge” and second, popularized versions of it are made available to publics. One finding of his study was that it was not only challenging to conceptualize versions of science as being genuine or popular, but it was difficult and even impossible to detect when the popular versions taint the genuineness of science. His account explains the struggle in trying to locate an exact boundary between pure and distorted science (Hilgartner, 1990). This murkiness however, as Hilgartner (1990) indicates, places scientific experts at an advantage, whereby they get to define

when or which simplifications are accurate and fitting. In other words, they have authority to draw boundaries between accurate science and what they identify as inappropriate popularized distortions (Hilgartner, 1990).

In the section below, I present findings from this research study that suggest that activists also engage in assessing accurate or credible science. Their individual criteria and their potential role in implications for their learning are discussed in the following two sections.

### ***Results***

**Individual activist criteria.** In this first section, I will present the criteria that each activist uses to assess credibility of claims and those making claims. Phil is not part of this section, as he had stopped attending meetings and events by this time, and so was not available to discuss his criteria.

**Adam.** For Adam, being known as the data guy in both groups, it is not surprising that data is a determining factor or criteria to assess credibility. This interest in data is not surprising given his love for learning that started at an early age as discussed in Chapter Two, “In Communities.” Having worked in industry for many years, he became trained to read data in detail. He mentioned not trusting peer review, and preferred running calculations on his own while reading data to assess the validity of their calculations. He said that for him to feel personally comfortable the numbers or the data need to make sense. He explained his relationship to data as a way “to convince myself that [it’s] good information... is it really opinion, is it bogus, is it a want, is it a wish. You start looking into this stuff ... and say wait a minute, is that really true? And it might take who knows how many hours to see if it’s true and look at that from other perspectives and say wait a minute, that’s really partially true. Or it’s bullshit, you know. And then you put up your review, summation, your analysis for the rest of

the group hoping they learn something from this but there's so much misinformation out there.”

He also stated that, “data can [be] tainted, calculated incorrectly, changing, plotted incorrectly, so that's why we look at many sources of data and separate goodness from badness type of data and do some statistical tests.”

Adam mentioned the importance of checking data and its interpretations from multiple sources, in addition to checking for source credibility to verify his data analysis. This he applies to data published by academic, government, and industry sources. For him opinion pieces or blogs are just that, opinions and not “truth.” He provides a list of considerations that he uses to assess data, such as, “was the data collection method sound? Did you look at all the primary areas of data or just focus on one thing? Sometimes one thing is good, sometimes one thing is not. What did you really test for? There are sometimes different tests you have to go through. Sometimes you have enough data to run a statistical test.” When he starts seeing some patterns coming up, that's when he concludes it to be true.

Adam is also critical of others who do not assess and/or use data accurately. He said, “assumptions are not true. Therefore, I dismiss it but other people will take that there and run with it. [Without] doing their homework, they run with the data and that's counterproductive to what our goals are.” According to him, one needs to go beyond trusting a source and considering the data itself to avoid misunderstandings.

It is interesting, however, to note that when it comes to personal or home-related issues, Adam does not act the same. His partner does not allow him to go grocery shopping, he said, because he does not read labels for food. This was surprising to learn, how the context of an issue seems to determine whether or not Adam becomes the “data guy” or the detail-oriented person.

Overall, for Adam “good data” is a defining criterion to assess credibility. He considers sources to be useful in helping to test the trustworthiness of data, but ultimately he focuses on data to make any conclusions.

**Paige.** As mentioned in earlier chapters, Paige has extensive experience with journalism and trusts independent media. She is frustrated by the mainstream media, because “unfortunately, it’s been dumbed down so much and turned into an ‘info-tainment’ in the mainstream, but there are millions of great journalists here.”

When asked to comment on her criteria to assess credibility, one of the first factors she mentioned was sources. She said that she needed to assess who provided the data for the article and who was being quoted. For Paige, primary data or documents seem less important, but instead she turns to information about the source. She mentioned going beyond the source’s affiliation, because for her a big research institution did not always mean good work. According to her those research institutions often received industry funding for research, which she did not trust. Instead of focusing on the institutional affiliation, she preferred reading through the research or faculty member’s CV and history of funding and publications.

When it came to better understanding the science from primary documents, she said she relied on Adam. She also mentioned how she used to read through journal articles, but no longer does so mostly because of her busy schedule with her job and also from being bombarded everyday with too much information via emails. Paige held an active job during my data collection phase (unlike many of the other members, who were retired and/or worked part-time), was involved in multiple groups, and received hundreds of emails every day. She however mentioned reading news articles more thoroughly.

Overall, for Paige, she used her criteria to assess science in media stories. Her criteria included: sources and story validity tied to journalist credibility.

**Vanessa.** When asked to discuss her thoughts or criteria for credibility, Vanessa hesitated. She spoke of an experience with another group she recently encountered, where another individual pointed out her misinterpretation of an article's research discussion. It can be inferred that while Vanessa reads articles that discuss research, she is however not confident about her interpretation is right. This is also suggestive of her not feeling absolutely confident enough to assess credibility of information. At one point, she mentioned how Riley, because of her science background, could be in a better position to make these distinctions. It could be that, having studied sociology and education, Vanessa does not feel qualified to make assessments on credibility. She hesitated to make more comments about her process of assessing an article, but eventually mentioned that she focused on the source or the researcher of the study and their connections to industries. Vanessa also expressed that she feels strongly about conducting research that has meaningful implications.

Overall, Vanessa did not feel totally confident in her skills to assess credibility. When she did however assess her criteria, they included learning more about the source or researcher, and also about the implications of the specific research.

**Riley.** In college, Riley majored in biology and minored in math. She went on to work in research labs where she studied black flies and fruit flies. So she has a scientific background. As discussed in the previous chapters, Riley does have the ability and interest to comprehend science. She also sends many emails to the group's listserv, usually involving updates or articles. Riley said that she usually does not have the time to read through books, because she gets so much information from emails and different listservs. If she finds something interested, she

forwards it along to others who might benefit from reading it as well. She mentioned not pushing an agenda when forwarding an article, as she wanted individual readers to form their own opinion from it. From all the information she gains from these emails and listservs, she has created a system in her computer to keep track of accidents or disasters related to fracturing. Another criterion that seemed important for Riley was the amount of evidence. She mentioned that she did not believe in isolated instances. Riley presented a theory in the context of autism and vaccines, discussed a story she came across in her daily reading, and concluded that it was just one isolated case, and that more evidence is required to make any more formal claims. She said, “you don’t take just one isolated [case].” She seemed to exercise skepticism while reading these stories.

She also mentioned being cautious about confusing correlation with cause and effect. She explained this in the context of finding a correlation between GMO mosquitos being released and the Zika outbreak in Brazil. She said she found it to be an interesting coincidence, but did not believe there was necessarily a cause and effect. She ended that story by saying that it was all theory at that point, “until proven otherwise.”

When asked about how she assessed credibility, she mentioned reviewing the funding source and the evidence presented in the article. She said, “For me what science is, is what's fact. When they find chemicals in the water. That's a fact. You can't dispute that. Although there's different measurements and different tests.”

Overall, Riley relies on science stories from emails and listservs. She uses criteria such as amounts of evidence to distinguish between “theories” and “facts” and also checks the sources of funding. As mentioned in the previous chapters, Riley is known to skim through articles and not really work on digging deeper.

**Charles.** Charles seems to have deep respect for science and scientists. Charles mentioned how he admired science being presented to substantiate claims. He said that “when they [scientists and speakers at the Green Squad events] talk about their studies, or they talk about the research that they have to back up what they say, it just makes it more, to me, that you can believe it. And it's more credible. Because it somewhat can be substantiated.” He described being impressed with scientists for their ability to retain and use factual information well to explain situations. He seems to deeply respect scientists and consider them as credible sources of information.

It is however interesting to note what Charles considers science. For him, individuals on the pro-fracturing side are not using “science” and are forming decisions based on non-scientific reasons such as trust in the industry. For Charles, the anti-fracturing side had the right science to back up their claims whereas the pro-fracturing side’s claims were not substantiated by science. He expressed frustration over how some “smart people” were not believing science and sometimes being duped into trusting industry rhetoric. This indicates that for Charles, being able to examine evidence to substantiate claims was a criteria to assess credibility. He also mentioned that for him, credibility of a scientist decreased when their funding came from the oil and gas industry.

Overall, for Charles, being able to substantiate claims with evidence and funding sources were significant criteria to assess credibility.

**Bridget.** Similar to Adam and Riley, Bridget held a technical job that required her to be familiar with data. She mentioned reading up on not only articles in line with her position, but also those that are not, because she wanted to feel better prepared to counter the opposing side’s rhetoric. She mentioned reading enough from the other side to be able to make that

counterargument. She mentioned two main criteria to assess credibility: one, the funding source of information and two, the background of the scientists. She mentioned finding scientists more credible when they had some experience with the oil and gas industry and now produced research or shared their experiences that did not support fracturing. Similar to Charles, Bridget's criteria seemed to be dependent on the position these scientists are taking. While Bridget mentioned reading through data on both sides, she seemed to consider science that supported her position to be more credible.

Overall, for Bridget, her criteria for credibility included the funding source of information and background of the researchers.

**Devin.** With a science background in school, because of his interest in pre-med during college, Devin had exposure to some "heavy science" classes. He felt that he and Linda both had the ability to understand technical details, and thought of Adam to be highly technical. He points out that as activists, they spend "innumerable hours researching." He expressed his frustration over how, in his view, our society is not allowing or encouraging more people to read and keep themselves up to date with current events.

When asked about his criteria to assess credibility, he mentioned that he often preferred going to the source or reading directly rather than relying on others. He said that for him to be able to trust science, he needed to trust the scientist conducting the science. Given how strongly he felt about the credibility of the scientist, I asked him if he would read work from a distrusted source or scientists, i.e., those on the other side. Similar to Bridget, he mentioned how he read their "rationales." He mentioned needing to consider the source of funding in order to place his trust in the scientist and science.

During meetings, when he couldn't possibly check on every source or article being presented, he relied on asking questions to make his assessment. He mentioned that there were times that he did not trust others' research or understanding of certain materials, and he seemed to be open about expressing those concerns to those individuals. In addition to assessing credibility, he mentioned that he would ask questions anytime he needed "further explanation," or some other details to complete his understanding, or thought that the topic needed to be further explored in the group.

Overall, for Devin, his main criteria came down to being able to trust the scientist/researcher, funding sources, and also ensuring that the claims/evidence being presented made sense.

**Linda.** Growing up, Linda was drawn to science. She mentioned her biology teacher in school being a mentor. She however had a tough undergraduate experience, and graduated with a degree not in science. She however returned to her "love" – science – and got another degree in animal science. She went on to become a science teacher.

Similar to Adam, Linda preferred to focus on the data and their details. She mentioned needing to be meticulous in interpreting scientific data and also being cautious in using very specific language to ensure conveying accurate information. She said that when reading articles, one needed to be thorough and also analyze "what they're talking about, exactly what they're [proposing], are they discussing one aspect, are they leaving something out or are they talking about the same thing here and the same thing there." She seemed to focus on the evidence and argument being presented to assess where they hold together and where there might be gaps.

In addition to looking at the data and being skeptical about reading arguments, she mentioned that considering the funding source is also important. She thinks the best research comes from having a third neutral party conducting that research.

Unlike many in the groups, Linda says that it is also important to note who might be doing the interpretations of the data or study. She explains, “because honestly sometimes the activists too have as biased interpretation as the industry. And I'm as weary of that as I am, I mean I hate to say it, but there can be just as much inflated emotional hyperbole on our side and that just irritates the hell out of me. I just want to slap them silly. I don't make myself popular with that either.” This is a feature that sets Linda apart from many in the groups. She explicitly discusses how the inflation or misunderstanding of science occurs on both sides, and how she values getting the science right and not engaging in hyperbole.

Overall, Linda's criteria seem to involve data itself, the argument in the article, and funding sources and their influences on research. She seems to value getting the science right and does not mind correcting individuals on either side when they do not get it right.

**Bob.** He remembers his grandparents being supportive of formal education, but not being able to afford to send all their children to college. His dad's youngest brother was the only one who could be sent to college, and he went on to become an oceanographer and a naval architect. He spoke highly of his uncle. While Bob appreciated formal education and science, he found his calling in art and design.

Bob is aware that he has biases, and said that he “will admit that I go through a process of just being aware that everything I read and all the e-mails I get and stuff like that...I'm very cautious as to whether it's bogus or not. And if it's bogus, I just trash it.” He said that he would have an innate feeling to guide him towards what felt right. He mentioned that he does not

consider himself to be a “hardcore scientist” and so bases his decisions from feelings. When asked if he first reads the information, he said he tries to read but if the reading becomes too technical he loses interest. When asked to unpack that feeling, he described it to be a matter of trust. Overall, Bob’s criteria include innate feelings and trust to assess credibility.

**Martin.** Although Martin holds a PhD in Clinical Psychology, he does not claim to be a scientist. He mentioned having to rely on Adam often for scientific understanding. He also mentioned going through publications and also receiving information from “inner circles” of certain organizations to keep himself updated on current readings.

Similar to other members in the groups, Martin also mentioned not trusting information coming from industry, but still reads their materials in order to know “what the other side is up to.” He said that he distrusted industry quite often and also government information sometimes. He goes onto say that “there's good science and there's industry science. The peer-reviewed good science, which is the most objective, will say some things that support what I think.” He also said that, “there's also some peer-reviewed science that makes me think differently about some things and, so, in order to be well informed, I depend on that science, not the non-science that the industry puts out. Because they're paying somebody to do it. And they want the output to come out a certain way.” For him, scientists taking an objective position meant credible research. According to him, “industrialists” or “bought scientists” are unable to hold an objective view while conducting their research due to the influence of funding. Martin views science as an endeavor that “starts with genuine curiosity. And, the desire to know and to learn and to add to the fountain of information about the world. When science comes from that point, from that part of the gut, mind, and soul, it has a chance of being valid and reliable.” He goes onto say, “when a scientist gets bought, there's no way it's about curiosity anymore. It's about money and there's no

way that the outcome is going to be worth two cents. And that's why I do not trust that kind of science.” Martin is unable to even call, let alone trust, any research or science coming from the industry as he considers it tainted due to the influence of funding on research directions. Along with producing objective research driven by genuine curiosity and a lack of financial interests for the scientist, Martin also mentioned peer-review a few times as a measure for credibility.

Overall, for Martin, science involved having a scientist who is not funded by industry, can take an objective position, and whose research went through a peer-review process.

**Criteria summary.** The criteria established by individual members is summarized in Table 4. For Adam, Riley, Charles, Devin, and Linda, being able to substantiate claims or theories through data is a criterion. For Adam alone, it was all about data and not so much about the researcher. For Paige, Vanessa, Charles, Bridget, and Devin, it was important to test the credibility of the researcher. For them, it was important to take a researcher’s findings within the context of the researcher’s (in Paige’s case, the journalist’s) credibility. Paige, Riley, Charles, Devin, Linda, and Martin also discussed the criteria of being able to hold an objective position, which to many of them meant not having funding from industries to influence their research. Martin also included the criteria of science needing to experience the peer-review process. Vanessa also included the notion of conducting meaningful research.

**Table 4: Summary of criteria**

<b>Criteria</b>	<b>Activists endorsing the criteria</b>
Validating primary data	Adam, Charles, Devin, Linda, Riley
Funding sources and an objective position	Adam, Bridget, Charles, Devin, Linda, Martin, Riley, Vanessa
Researcher background	Bridget, Devin, Paige, Vanessa
Journalistic credibility	Paige
Implications of specific research	Vanessa
Peer review	Martin
Innate feeling	Bob

The criteria activists accept can potentially affect their type and amount of science learning. For Adam, the most important criterion was to assess data. For him, it was secondary if the research was peer-reviewed or not, and who was conducting the research. He insisted on triangulating data from multiple sources to draw his conclusions. He remained open to reading, assessing, and learning from multiple sources. According to him, he did not let where the research was coming from influence his interest in assessing the claims. He did not ignore those criteria, but instead held them as secondary to data analysis. This aligns well with his identity in the group, as being the “data” guy. It only seems fitting then that his top criterion was the validity of data. Linda is similar to Adam in this regard; while she does think funding sources and researcher/analyst characteristics should be considered, she places more emphasis on the data itself. This again aligns with her identity in the group as being a more science-driven one. On the other hand, for Paige, Vanessa, Charles, Bridget, and Devin, the researcher (or journalist) credibility and their history with industries or research influenced the decision to proceed to learning from materials proposed by the competing side. For Paige, Riley, Charles, Devin, and Martin, credibility and learning was also tied to the ability of the researcher to conduct objective science without being influenced by funding sources. As data was not their individual area of focus or part of their identity in their groups, it did not show up as a criterion. Their criteria involved more about the individuals conducting research. For many of these activists then, their identity in the group often contributed to the criteria they chose to assess credibility for learning.

Some members such as Bridget, Devin, and Martin mentioned reading the other side’s work, to keep up with them or to better understand their rhetoric. While this allows them to at least read through some or all of their information, the intention is not to understand but to be prepared to counter-argue. There is a lack of openness to being proven wrong in the process of

investigation. For Charles and Martin, industry information was not even qualified to be called science, as they did not see their research to be objective or having gone through peer review. While Charles closed the door on learning the other side's research, Martin remained open; however the openness was still limited.

It can be noticed that the way individuals assess credibility can influence their learning. If they determine that all industry science is not considered credible, then they rarely proceed to learn about the "science" produced by the competing side. When some insist on still keeping up with the other side in order to keep track of their arguments, there is some openness to accumulating information, but very little room to changing their existing understanding. It is as if they are gathering information enough to refute, but not to modify or alter any possible misunderstandings they might have. Their learning is constrained by a strong belief that their position is the right one in this controversial issue.

As discussed in Schrader (2015), according to Vygotsky, learning involves both assimilation and accommodation of new information to existing knowledge, and sociocultural factors influence these learning processes. For him, the sociocultural environment determines the form of construction and/or reconstruction of knowledge in an individual. For the activists in this study, the sociocultural situation can be simplified as being opposed to industry, corporations, or sectors of government supporting hydraulic fracturing. This sociocultural environment seems to be driving their criteria for assessing credible sources for learning wherein they are reluctant to learn from any opposing side materials. For Vygotsky, the scope for learning is connected to cultural boundaries, and can be expanded when there is reflection on cultural appropriations. For the activists involved, this reflection on their disregard for the opposing side materials is, either

consciously or unconsciously, non-existent. This could be a contributing factor to their limited learning from the opposing sides, which needs to be further explored.

### ***Conclusion***

This chapter began with a review of the value we place on scientific credibility and the ways activists engage with credibility of scientific knowledge. The chapter outlined some criteria for credibility and their potential implication on learning among activists in the Green Squad and the Nature Protectors. While often the discussion of assessing credibility has been in relation to scientists, sociologists, or philosophers, this work presented an investigation of the criteria used by individual activists.

## CHAPTER 6

### CONCLUSIONS

In this chapter, first, I will summarize briefly the findings of my study. Second, I will outline my reflections on the limitations of this study. Finally, I will conclude this chapter by presenting a few future directions that I and other researchers can take to build on the findings of this study.

#### *Summary*

I followed two activist groups, the Green Squad and the Nature Protectors, for varying periods of time to understand how they learn and their relationship to science. The contributions of this study include the following: The two activist communities studied were utilizing transactive memory systems and were functioning as collective minds. While individually each activist was learning and contributing to the transactive memory systems, their relationship which was closely tied to their internal group communication affected their ability to function effectively through their collective minds. While desiring to dialogue with like-minded individuals in their communities, the activist groups were reluctant to engage with people on the opposing sides. They were not enthusiastic about developing a stronger relationship with their community members, and believed that simply providing knowledge would help mobilize their community members. They were unwilling to see the value in learning anything from the opposing side. As social constructivists have discussed, dialogue is a significant factor that contributes towards learning. By limiting opportunities for dialogue, these activists were also limiting their opportunities for learning. The activists also seemed to have developed their own sets of criteria that guided their individual learning. If they were able to trust a credible source,

they were more open to learning from the source's work. If they were unable to trust a source, they either discarded the materials or read it with an intent to debate its rhetoric. The openness to learning or revisiting their existing knowledge of hydraulic fracturing was bounded by their criteria for assessing credibility. Their criteria seemed to also closely relate to a sociocultural environment in which they routinely discredited information from the opposing side. They only learned from materials that reinforced their take on issues.

It should be pointed out that I started this study in the midst of the controversy and also a few years after the formation of these groups. This allowed me to observe and assess these groups while they engaged in additional learning of issues and not when they were just getting familiar with the issues. In other words, they were not in a "blank slate" position when I started this study, and were already familiar with the issue and were engaged in learning about it for a few years before I entered the field. During the time of this study, the goals of their learning were to keep themselves updated on current events and materials surrounding issues of interest in order to present that information at venues such as town board meetings, events, or through articles and letters to their local newspapers or other media outlets. Their target audiences included village authorities and other community members.

### ***Theoretical reflection***

The findings of this study suggest three themes that require further investigation in order to produce more substantial contributions to existing literature. A brief discussion of these potential research directions is presented below.

In chapter 3, the literature review revealed that research involving TMS and CM has often focused on assessing performance or productivity in groups (Hood, 2014; Lewis, 2004; Li & Huang, 2013; Moreland et al., 1996; Rulke & Galaskiewicz, 2000). This study shows that the

theoretical framework of TMS and CM can also be used to study the individual and collective learning processes, at least among activist groups. Within the fields of organizational and group communication, this study used primarily the literature on TMS and CM. The findings of this study can be enhanced by further integrating them into the broader theoretical literatures of organizational and group communication.

In chapter 4, the theoretical review describes the desire for nurturing science literacy in order to have informed publics who would likely be supportive of sciences and technologies (Scheufele, 2013; Shen, 1975). Continual efforts are made by organizations such as the U.S. National Science Foundation and the Pew Research Center to measure how much accurate information individuals possess on various issues. But Roth and Lee (2004) argue that individuals need not know everything about an issue, and rather should be able “to participate in collective activity and to locate knowledge when and where they need it” (p. 284). They propose reframing “scientific literacy as a collective property” where knowledge is held through contributions and communication among collectives (Roth & Lee, 2004, p. 263). Borun and colleagues (1996) also recognized, in the context of science museums, that while learning can occur in “individual brains,” groups (or, more specifically, families) can enhance that learning through their “shared knowledge, values, and experiences” (p. 135). Similarly, this study indicates that along with individual learning, there was group learning through CM in the two activist groups. This study did not explore ways to measure collective science literacy emerging in these two groups, and that issue needs to be further explored through future research.

In chapter 5, the credibility literature was briefly discussed, but the field is much larger than could be explored for this project. Future research will need to engage more fully with the broader field of credibility to analyze the data from this and similar studies more thoroughly.

Within the limited literature review provided in this study, there were some points made on credibility that need to be revisited here. For example, there was a discussion on activists potentially gaining “interactional expertise” (Collins & Evans, 2002) and this was claimed to be associated with an ability to assess for credibility. In the study, it can be seen that not all activists were able to gain interactional expertise. It was only the activists who were known in the group for their understanding of scientific/technical expertise who displayed some level of interactional expertise. These were the activists who assessed credibility of scientific arguments through reviewing data directly. Other activists in the groups, who also valued this criterion, relied on these specific individuals for their assessments of credibility of the scientific/technical arguments. There was also a discussion about how scientific experts are often assumed to be more credible in assessing scientific claims because of their experience in the field, and how activists are often criticized for being unable to assess what counts as credible science or sort through the right science from the popular or misinterpreted science (Collins & Evans, 2002; Hilgartner, 1990). This study shows the different criteria activists use and/or privilege during their assessments of credibility. Many of these criteria (evaluating data, paying attention to funding sources, assessing researcher background, exploring journalistic credibility, exploring implications of research, checking for peer review, and having innate feelings) seem to align with criteria that professional scientists would use as well. There is not enough evidence in this study, however, to analyze whether the criteria are in fact used the same way by the activists as the professional scientists. There needs to be more research to explore: how similarly or differently to scientists do activists conceptualize and apply these criteria; what type of materials activists and scientists study while making these credibility assessments; and, their purposes for engaging in credibility assessments.

## *Constraints*

**Timing.** I developed the proposal to conduct this research study in early 2014, got the proposal approved by my committee in August, 2014, and my application was under review at the IRB in late 2014. On December 17, 2014, I heard the news that the Governor Andrew Cuomo announced his decision to ban hydraulic fracturing in NY state (Kaplan, 2014). I immediately sent an email to one of the members in the Green Squad, asking if the ban would affect their group in any way. To which, I received a response saying, “Oh, that ‘ban’ is hardly a ban. We have LOTS of more work to do, maybe even harder now because people think it’s really ‘banned.’ You bet we’ll keep going! We did have a mini celebration of this mini good news.” Both groups continued to keep fracturing in their agenda, but it certainly did not become the most important or the only issue for the groups. This timing can be seen as a limitation, since the groups had “learned” about hydraulic fracturing long before my study and no longer had incentive to focus so closely on it. But the timing can also be seen as useful for the research, because it highlights that this study is exploring the issue at a specific period in the life cycle of the controversy of hydraulic fracturing. Thus I conducted this study during the period of the controversy when there was uncertainty about whether the issue had reached political closure or not and; the traditional media agenda was moving on to ensuring that the ban was implemented. This means that along with potentially experiencing lower interest or alarm among community members opposing the technology while the issue remained prominent for a smaller number of activists, I was able to explore the ways they related to learning about the controversial issue for themselves, within groups, and with their community.

Through interactions with members in both groups, I realized that they had intentionally learned about hydraulic fracturing when the controversy was beginning to surface in their areas,

during 2005-2008. Phil was one of the main organizers of one such learning initiative. He said, “at that point it was to educate people about [hydraulic fracturing].... The gas companies were still trying to get leases at that point and renew leases and so we wanted to educate people really widely about it.” Phil explained the process through which they began to hold these educational events by first engaging in a listening project. The project and initial event aimed at gathering interested individuals/activists instigated a learning initiative. The template of every meeting for the learning initiative involved: announcements and updates that anyone in the room could make, followed by small group breakout sessions. During the announcements, one of the group members took minutes and sent them to everyone in the group via email. During the breakout sessions, each group would work on an agenda or plan related to hydraulic fracturing within a community. The learning initiative gave rise to a 12-week course, where individuals could learn about the science and technology of hydraulic fracturing. Phil mentioned that he took that class twice, before he started teaching others. Eventually, the small groups became more independent and started their own community organizations.

In an ideal world, that moment would have been a great time to investigate the process of intentional learning that activists engage in to educate themselves about an issue through such learning initiatives. In this research study, there was not so much intentional learning as there was unintentional science learning.

**Focus.** As mentioned above, the timing of this study influenced the nature of available data. One of the members said, through an email, that the focus on hydraulic fracturing if anything needed to be stronger following the Governor’s decision to “ban” fracturing. The Green Squad’s first event was directly related to fracturing, the second event was somewhat connected to fracturing, their third event was related more to health than to science, and their fourth event

focused on another controversial technology. Nature Protectors seemed to keep fracturing still in their focus, but also focused on other community issues during their meetings. For example, their first event, during my time with them, was being organized to focus on their local landfill. The event was eventually canceled.

Overall, the focus on hydraulic fracturing for both groups seemed to wither following the ban. While I do not have any data to indicate that before the ban, all or most of their focus was on hydraulic fracturing, some members said this was true. While for some people the ban concluded their efforts to fight for or against hydraulic fracturing, for others it suggested that a lot more still needed to be done.

**Limitations on/to findings.** As described in Chapter Two, “In Communities,” I took extensive measures to ensure that the study presented valid and reliable results. There are however some limitations that I encountered during data collection and analysis that are worth discussing.

In Chapter Four, “Deficit-Dialogue models of communication,” I concluded that dialogue was important. I concluded that many activists were engaging in a dialogue with publics who mostly agreed with the activists on the issue, rather than talking with individuals who were apathetic, on the fence, or are in disagreement with them. As I finished writing this chapter, I encountered a personal experience that showed me how practicing this recommendation of dialogue with those on the opposing side can be quite challenging. I had found out that two of my “friends” were supporting a political candidate not of my liking. I had strong feelings against this candidate, while my friends had their own reasons for supporting the candidate. Both of my friends, individually, invited me to have a conversation with them about our positions. One of them said something to the extent of, *aren't you the one promoting dialogue-oriented methods in*

*your work? Shouldn't you be open to engaging in a dialogue with me in order to make an informed decision?* I agreed, and had a face-to-face conversation with this individual. The first few minutes of the conversation were the toughest. I could not bring myself to listen to this individual, because I was caught up feeling annoyed and judgmental. I voiced my difficulty to this friend, and then together we decided to listen to each other, one point at a time. We took turns. I left the conversation having learned something new about this candidate, but not having changed my opinion about the candidate. I realized that I need to plug this reflection in to this study. While I critiqued the activists that I studied saying that they need to engage in dialogue even with those on the opposing side, I would like to acknowledge that it is not an easy task. It takes effort and intention, and will also require some practice on listening.

I wish that I had more access to the lives of the activists in order to strengthen the findings of my study. For example, I would have gained much more data about their individual processes of learning if I had been able to follow them personally. Being able to observe Adam when he would run some calculations himself or watching Riley go through her emails and make decisions on when and how she forwards certain articles or flag some of them-- having such data points would have provided me with a better understanding of their individual learning. Such intrusive methods might also change the observations, as they might make the participants feel uncomfortable. As an alternative, I could have asked each of them to maintain personal journals. These too come with their own limitations, but it would have certainly added something more to the interview data.

I am also not analyzing the validity of the “science” discussed in this study. I am not trying to verify if the science that is being discussed at meetings, during interviews, or at events is valid. If I started to ask this question, this study would become very different. As the

knowledge of controversial sciences and technologies are developing, attempting to validate them before they reach closure can be difficult. This is less of a limitation, and more of a methodological consideration.

### ***Future directions***

There are a number of future research studies that I can envision to help take forward the study of activists and their relationship to and learning of science. One would be to study more activist groups, to help understand if the findings of this study are bounded to these specific groups or to other similar activist groups focused on controversial sciences and technologies. Another would be to start studying activist groups right when the controversy is beginning to gain momentum. As discussed above, it would allow the researcher to investigate more intentional learning about the controversial science or technology. Third would be to research ways for activists to start becoming more dialogic, not only with publics who have similar views on the issue, but also with those who are apathetic or on the fence, and eventually with those who are on the opposite side of the spectrum. It would also be worthy to study if applying dialogic practices could influence the trajectory of scientific and/or technical controversies. Fourth, I could also envision studies aiming to understand the influence of credibility criteria on individual learning and also their effects on the emergence, continuance, or termination of controversies in a specific field of science or technology. Finally, research should also investigate (a) how grassroots movements might engage with science, (b) whether or not they engage differently or similarly to other groups, and (c) how their learning and approaches to science are shaping controversial issues in communities.

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