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Fukushima Nuclear Disaster Response Impact on Graduate Students

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Walden University
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Abstract

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MS, Temple University, 2007

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Dissertation Submitted in Partial Fulfillment

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Abstract

The roles that universities played in the response to the Fukushima nuclear disaster were significant and varied; however, there was limited study on participating graduate students. The purpose of this study was to understand the impact of disaster response on graduate students' personal and academic development. This study examined research questions about the perceived impact on academic and personal identity development. Empowerment, cognitive content engagement, general systems theory, and utilitarianism formed the theoretical foundation. This study used a transcendental phenomenological approach to examine the subjects' experiences in the context of involvement in disaster response. The primary source of data was semiopen interviews with individuals that were publicly recruited graduate students at the time of their involvement in the Fukushima nuclear disaster response; data were triangulated with interviews from faculty supervisors. Analyzing the data resulted in the themes of predisaster normality, proximal impact, stress, perception of foreignness, relationships, breakdowns in relationships, change, new relationships, and religion. Interpreting these themes, it was determined that proximity played a role in the decision to engage in the response effort. Furthermore, identification with victims increased the stress of participants. While the experience was empowering, caution is necessary. Further research is recommended into disaster recovery, the role of interpreters in disaster response, and the role of universities in disaster infrastructure. This information can promote social change by enabling graduate students and gatekeepers to better understand potential outcomes for incorporating graduate students into disaster infrastructure.

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Dedication

I would like to dedicate this dissertation to my son, for whom I decided to begin this degree, as I want a brighter future for him so that he can lead the world to the brightest of all possible futures.

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I would like to thank my wife and child for putting up with me and giving me time to undertake writing periods during which I was, I am sure, not too pleasant to have in the house. I would like to thank friends and associates for the help they provided. I would also like to thank my Chair, Dr. Hudak, for guiding me on this process and balancing guidance and freedom to help me make the document as good as it can be while also still being my paper. I would also like to thank my methods mentor, Dr. Hoye, for helping me overcome the hurdles in designing and undertaking this study.

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Chapter 1: Introduction to the Study

Introduction

In March of 2011, Japan experienced a major earthquake, which triggered a major tsunami, which triggered a nuclear disaster. This disaster led to a release of radiation, which could lead to increased cancer risks in the future (Anzai, Ban, Ozawa, & Tokonami, 2012). However, the greatest threat of the radiation is likely the psychological threat (von Hippel, 2011, p. 33). There was also a double-sided threat to the environment. While the actual release of radiation was an environmental catastrophe, the conversion from nuclear to fossil fuels could fuel more global warming, leading to further disasters. The involvement of universities in this disaster response (Fujishima & Suematsu, 2012; Fuse, Igarashi et al., 2011; Fuse, Shuto et al., 2011; Ishii, 2011; Kato, Uchida, & Mimura, 2012; Koyama et al., 2011; Monzen et al., 2011) was similarly a sign of hope and concern. While the university involvement allowed a more robust response, the role of students in the response may be of concern. Improving the understanding of how students react to involvement in disaster responses may lead to the development of curricula that prepare students more effectively as well as an improved disaster response infrastructure.

In this chapter, I will provide an outline for the paper and study as a whole. First, I will provide some background information on the nature of this topic. In this background, I will explain the gap in the literature and the need for the study. Aligned with this need, I will state the problem followed by the specific research questions addressed by this study. The purpose of those questions is clarified in the purpose statement. All of these

components are aligned with the nature of the study. Finally, the potential significance of the study will be addressed before summarizing this chapter.

Background

Disasters are the result of hazards overtaking the preparations made to account for the hazards. The United Nations Hyogo Framework seeks to focus international effort on preparedness in order to decrease the amount of harm suffered from disasters (United Nations (UN), 2005). In order for this to occur, it is essential that communities be incorporated into the planning for disasters (Sabur, 2012, p. 38); in addition, there also needs to be an understanding of the need to develop skills for working in ad hoc networks (Nolte & Boenigk, 2013). This shifts the perspective of disaster management from a top-down or bottom-up argument to a discussion about forming communications strategies and allocating of competencies.

Better understanding how to mitigate the impact of disasters begins with an understanding of the disaster cycle. While there may be disagreement over the exact terms or placement of activities in specific stages, it is agreed that there are the predisaster phases, mitigation and preparedness, wherein infrastructure and preventative measures are handled, and the postdisaster phases, response and recovery, wherein damage is limited and the return to normalcy is begun (Deshpande, 2011, p. 98; Kapucu, Arslan, & Collins, 2010, p. 227; McCann, 2009, p. 331; Sabur, 2012, p. 38). These phases are interdependent. Every action is dependent on all previous action and supportive of all following action. The recovery phase is generally the phase in which reflection on the efficacy of each of the stages is incorporated, and that reflection needs to

be focused on learning to be effective (Fitzgerald et al. 2012, p. 229). Beyond the interconnection inherent in the phases, there is one common necessity in each phase: communication.

Communication is the foundation of social capital. Social capital is the trust between systems such as organizations or communities (Haraoka, Ojima, Murata, & Hayasaka, 2012, p. 2) Trust is essential for collaboration (Kapucu, 2006, p. 218) and supporting networks (Nolte & Boenigk, 2013, p. 162). Information is also essential in promoting an effective response. Part of that response is the reciprocity of social capital and information gathering. Sharing information develops social capital (Fitzgerald, 2012, p. 232) that increases the capacity to gather more information (Kapucu, 2006, p. 210). An open and honest position in sharing information is fundamental. This, in part, is due to the need to promote community resilience by facilitating communities' capabilities for aiding in the response.

For an effective response to a disaster to occur, a foundation of community resilience is necessary. This foundation begins with empowerment (Wiggins et al., 2009, p. 19). Empowerment allows communities to critically assess capabilities and vulnerabilities and seek the necessary resources to address the vulnerabilities. At the same time, empowerment is a powerful tool in the promotion of social justice. If people are marginalized, resilience will suffer (Ireni-Saban, 2012, p. 8). As such, it is essential to also specifically address the issue of at-risk populations.

The social cohesion of communities can hide issues that are revealed in a time of crisis. During a time of crisis, the negative aspects of social cohesion can emerge through

the reinforcement of stereotypes (Ganapati, 2013, p. 82) or the reemergence of racial animosity suppressed during normal periods (Roberts, 2013, p. 408). Women also suffer a great deal as they are at greater risk of physical and psychological harm (Juran, 2012, p. 3) and at a continued risk of marginalization following a disaster (Alston, 2014, pp. 288-289; Juran, 2012, p. 3). Often associated with this marginalization is the care for children. Children are also at special risk of injury and exclusion (Nikku, 2013, p. 63). In a similar situation are patients requiring continuing care who require special medical considerations (Mace & Doyle, 2011, pp. s60-s61). The concern over at-risk groups is essential in the planning of infrastructure and policy as well as in the undertaking of a response. This is of growing concern as global anthropogenic climate change increases the risk of disaster.

The world is changing, and global anthropogenic climate change is an important part of that change. The risk of disasters has doubled over the past decade (Kagawa & Selby, 2012, p. 208). The risk of disaster is growing and will continue to grow. While no individual event can be causally linked to climate change, the frequency and intensity of events in general can be (Sauerborn & Ebi, 2012, pp. 3-4). As such, it is important to plan for events that were considered beyond the scope of consideration in the past.

The Fukushima nuclear disaster was the result of a complex disaster involving an earthquake and tsunami, both of exceptional scale. With multiple meltdowns, hydrogen explosions, and an ongoing leaking of radiation, the Fukushima nuclear disaster was complex in and of itself (Funabashi & Kitazawa, 2012). A major issue leading to the disaster was the poor training (Funabashi & Kitazawa, 2012, p. 13) and work conditions

at the Fukushima Daiichi nuclear power plant, the part-time workers representing a socioeconomically at-risk population (Shrader-Frechette, 2012, p. 135). The radiation leaked from the plant was the greatest concern of those in the impacted area. With communications and electricity limited, the exchange of information between communities and response workers was complicated (Fuse, Igarashi et al., 2011, p. 404). This was also complicated by government failure to promptly release information on radiation risk in a contextualized manner. This was further complicated by the confusion over evacuation zones as different nations around the world, beginning with the United States, decided to ignore the authority of the Japanese government and introduce their own evacuation zones (von Hippel, 2011, p. 31). While the response had many failings, the disaster medical assistance teams (DMATs) were a bright spot in the response.

Part of the preparedness phase in Japan was the training and organization of DMATs. These small teams with medical and technical expertise enter disaster zones and provide care and support (Fujishima & Suematsu, 2012). Engagement in response work, however, may lead to psychological repercussions (De Soir et al., 2012; Guenther, 2012; Matsuoka et al., 2012). On the other hand, the experience of aiding in a disaster zone can also be positive (De Soir et al., 2012, p. 120). It is essential that support is provided to response workers before and after engagement (Guenther, 2012). A response worker who does not care for their own needs can become a burden rather than a benefit to the response; therefore, it is essential that, while there is an ethical duty to assist, there is an ethical duty for self-care (Lateef, 2011, p. 290). Response workers are the foundation of

any response, and following the Fukushima nuclear disaster support came from universities to aid in the response efforts.

Universities are often seen as ivory towers. This imagery provokes the concept of a distance between higher learning and society. To the contrary, universities are often integrated into with the communities in which they are located. This integration continues in times of distress. While past disasters have also seen universities stepping in to provide assistance (Kapucu & Khosa, 2013, p. 4), the Fukushima nuclear disaster saw an unprecedented amount of documented cases of assistance. Members for DMATs came from Keio University School of Medicine and Nippon Medical School (Fujishima & Suematsu, 2012, pp. 1-2; Fuse, Igarashi et al., 2011, p. 402; Fuse, Shuto et al., 2011, p. 398; Koyama et al., 2011, p. 394), Keio University School of Medicine and Fukushima Medical University provided psychological assistance (Kato et al., 2012, p. 17), Hirosaki University checked radiation exposure (Monzen et al., 2011, p. 2), the University of Nagasaki provided experience on radiation-related illness (Ishii, 2011, p. 147), and Osaka City University aided in radiation mapping (Ishii, 2011, p. 147). This broad range of support demonstrated how much of an asset universities are and demonstrated the possibility of a greater role in the future.

Universities are places of learning, and learning is formatted in curricula. In order for universities to be the greatest possible assets, it is essential that they implement disaster medicine (DM) coursework (Cummings & Corte, 2004, pp. 135-136). DM is a broad interdisciplinary study that may require incorporation into a variety of departments

or a range of specialized but integrated programs. The exact manner for implementation is a matter of discussion; however, the need for implementation is broadly accepted.

While there appears to be a broad background of literature pertinent to the subject, there is also a fairly important gap in the literature. That gap pertains to the role students have taken in disaster responses and their experiences. This is an important gap as it exacerbates another gap in the literature surrounding the special risk faced by students in disasters. Furthermore, if students are going to be asked to work within a disaster response effort, it is important that those students be fully informed. Without understanding the experience of students, there is an inability to fully inform students on what participation will entail. Therefore, this study was needed to explain the role students have played in past disasters and to facilitate incorporation of universities into the disaster response infrastructure in an ethical manner.

Problem Statement

The problem was that there are positive and negative experiences when engaging in disaster response (De Soir et al., 2012). While there was some literature on the impact on first responders, there was no information about the impact on student responders. Students not only represent an at-risk population, they also represent a store of valuable expertise. Balancing the needs of students with the needs of society is essential for disaster infrastructure; however, that need can only be made in an ethical manner through fully informed consent, which requires study into the experiences of students in disaster responses.

Purpose of the Study

In this study, I sought to improve understanding of how graduate level university students perceive the impact of involvement in DM during the response phase following the Fukushima nuclear disaster in terms of personal and academic growth, as aspects of identity.

Research Questions

The research questions addressed by this study were the following:

RQ1 – Qualitative: How do graduate students perceive the impact of involvement in the Fukushima nuclear disaster response on their academic performance?

RQ2 – Qualitative: How does identity development occur in the context of experience in the Fukushima nuclear disaster response?

Theoretical Foundation

In order to contextualize the experience of students involved in a disaster response, a broad range of theories were necessary to build a robust conceptual foundation. The first major theory was empowerment, a theory derived by Freire in order to promote social change (1973). The second theory was cognitive content engagement, an educational theory to help understand how students may have learned from their experience of the phenomenon (McLaughlin et al., 2005). There was also a need to contextualize the complexity of response activities. The general systems theory of von Bertalanffy facilitates a broader understanding through the exploration of open systems (1969). Finally, it was essential to incorporate an understanding of modern ethics,

beginning with the utilitarian philosophy of Mill (1863). These theories provided a foundation for understanding this study and its implications.

In order for justice to occur, there needs to be a balance of power. Empowerment promotes that balance of power; therefore, empowerment is the foundation of just government (Freire, 1973). In order to develop an empowered society, education focused on the development of the critical faculty is essential (Bergsma, 2004; Freire, 1973; Green, 2008). The critical faculty allows individuals to assess society and identify the difference between what is and what ought to be. Identification of this difference is essential to guide the push towards positive social change.

While empowerment is a theory about what should be learned, cognitive content engagement is a theory about how people learn. There are two aspects of cognitive content engagement: content and engagement (McLaughlin et al., 2005, p. 3). Content must be both advanced enough to support progression but also connected to previous knowledge (Kong & Hoare, 2011, pp. 310-311). Engagement requires that the students interact with the information in a manner that leads to deep processing (McLaughlin et al., 2005, pp. 9-11). This theory lays a foundation for understanding how people learn and in describing effective ways to promote learning. However, this foundation is based on the need for contextualization.

In terms of contextualization, the most powerful theory is general systems theory. General systems theory focuses on the understanding of how open systems work and can be predicted (von Bertalanffy, 1969, p. 39). Systems, in regards to organizations, governments, and communities, are socially constructed and need to be contextualized to

be understood as social constructs (Ison, 2008, p. 145). This relies on the utilization of social constructivist epistemology in order to address an understanding of systems. The utilization of this epistemology allows for an understanding of how systems work and the ability to understand how individuals may act within systems.

While the previous theories explained what should be learned, how it should be learned, and how to contextualize experiences, there was still the need for an understanding of what should be done with the knowledge gained. In order to handle this issue, it was essential to incorporate an understanding of ethics. Utilitarian ethics defines what is ethical as what does the greatest good (Mill, 1863). The key principles of medical ethics: beneficence, nonmaleficence, justice, and autonomy (Lateef, 2011, p. 290) can be seen as derivative principles of the larger principle of utilitarianism. Understanding utilitarianism provides guidance in ethical research while also guiding the path forward once the data are analyzed.

These theories will be further explored in Chapter 2. The theories of empowerment and cognitive content engagement were used to guide the analysis of student academic perceptions whereas general systems theory focused more on student social and identity related perceptions. Utilitarianism was a guiding theory for the design of the study and its implementation as well as guiding understanding of research implications.

Nature of the Study

This study was a transcendental phenomenological study of student experiences as the result of involvement in disaster response activities following the Fukushima

nuclear disaster. I interviewed graduate students involved in the response activities in order to understand their perceptions of the experience of the phenomenon. The methodology and research design are fully addressed in Chapter 3.

Definitions

For the purpose of this study, the following terms were used in a manner reflective of the following definitions.

Cognitive content engagement: Cognitive content engagement is a theory about learning focused on the interaction of a learner with material that is of sufficient level as to challenge the student to process at a deeper level (Kong & Hoare, 2011, p. 309).

Disaster: Disasters are events that are beyond the capacity of local agencies to respond (Lateef, 2011, p. 289).

Disaster cycle: The disaster cycle is a series of distinct and interdependent phases that aid in the understanding of the management of disasters, including mitigation, preparedness, response, and recovery (Deshpande, 2011, pp. 98; Kapucu, Arslan, & Collins, 2010, p. 227; McCann, 2009, p. 331; Sabur, 2012, p. 38).

Empowerment: Empowerment is the idea that, through development of the critical consciousness, those without power can come to share equal power in society (Freire, 1973).

General systems theory: General systems theory is the idea that it is important to understand how systems work internally as well as how systems interact with other systems (Ison, 2008, p. 145).

Mitigation: Mitigation is the period before a disaster wherein the implementation of regulation or infrastructure to prevent or decrease the impact of disasters occurs (Kapucu, Arslan, & Collins, 2010, p. 227).

Preparedness: Preparedness is the period before a disaster wherein the training of personnel and monitoring for emergent threats occurs (Kapucu, Arslan, & Collins, 2010, p. 227).

Recovery: Recovery is the period following a disaster wherein the implementation of long-term assistance and care to return communities to as close to predisaster normalcy as possible occurs (Kapucu, Arslan, & Collins, 2010, p. 228).

Resiliency: Resiliency is the development of local capacity to manage or adapt to disasters through the development of social capital, competence, and infrastructure, particularly information infrastructure (Kapucu & Khosa, 2013, p. 5).

Response: Response is the immediate actions following a disaster: providing for essential needs, evacuation, formation of ad hoc networks, and addressing continuing threats brought on by disasters (Kapucu, Arslan, & Collins, 2010, pp. 227-228).

Response workers: For the purpose of this study, response workers include not only first-responders, but also those in other capacities aiding in the response phase of a disaster.

Social capital: Social capital is a term that is often used in the literature, but is rarely defined. For this paper, the term will be used to specifically refer to the trust between organizations, communities, or individuals (Haraoka et al., 2012, p. 2).

Transcendental phenomenology: Transcendental phenomenology is the removal of all externals to focus on a singular phenomenon in order to find knowledge through experience (Moustakas, 1994, p. 41).

Utilitarianism: Utilitarian ethics is the concept that doing the greatest good for the greatest number of people defines ethical behavior (Mill, 1863).

Assumptions

The assumptions made in this study were that the subjects were truthful in their responses and that triangulatory data represented subject perceptions at the time of the response efforts. This study did not provide the opportunity for financial or academic gain; this condition should have ensured candid responses.

Scope and Delimitations

This study specifically addressed the experiences of graduate students involved in the response to the Fukushima nuclear disaster. The foci of understanding the experiences were academic performance, academic motivation, and identity development. The academic experiences were framed by the theoretical frameworks of empowerment and cognitive content engagement, whereas identity development was framed by general systems theory. Identity theories were not specifically used due to the multiplicity of current theories and the limited applicability for such theories in this context. While other theories of learning may have been helpful, such as Vygotskiĭ's zone of proximal development (1978, p. 86), the theory of cognitive content engagement was the most appropriate for the type of learning likely to occur in real-world contexts. Also, focusing on the response phase was chosen as it is often the most intense phase, thus providing the

most salient experience for understanding the impact of the phenomenon. Because of this choice, the experience may have been more potent than in other phases of the disaster cycle. Furthermore, because of special aspects of the Fukushima nuclear disaster, such as radiation, there may be limitations to some aspects of transferability.

Limitations

All disasters are unique. The Fukushima nuclear disaster was particularly unique in its complexity and the involvement of radiation. Those peculiarities and the overall small sample size limit the generalizability of the findings. However, the findings can be applied to further study and provide a broader understanding of the phenomenon. Furthermore, the thematic similarities between individual participants are likely to be evident in other graduate student response workers.

As a teacher and a graduate student, I had a bias towards understanding the positive learning aspect of the phenomenon. As far as was possible, I checked that bias through open acceptance of its existence and by focusing on the perceived importance granted to experiences by the participants.

Significance

With the increasing impact of anthropogenic global climate change leading to more frequent and larger disasters (Sauerborn & Ebi, 2012, pp. 3-4), there is an increased need for a focus on DM. Because of the breadth of disasters likely to occur, it is important to take an approach that encompasses all-disasters rather than focusing on individual types (McCann, 2009, p. 333). This also requires an increased focus on the development of infrastructure as damage mitigation is a function of preparation (Lund,

Gutman, & Turris, 2011). This requires a broad range of expertise in order to address commonalities between disasters but also to provide specific knowledge related to obscure issues.

In order to develop an ethical position on the role of students in DM, it was essential to understand their experiences. The experiences of students in response efforts represent a gap in the literature, one which has implications for education, ethics, and DM more broadly. Addressing this gap creates an avenue for advocacy related to the incorporation of universities into the disaster infrastructure. Institutionally, this also generates a need to develop DM curricula to address the different roles required for disaster response. This has broader social implications for the resilience of societies to disaster, and for the education system.

Summary

In this chapter, I outlined the themes and context of the paper as a whole. This paper is based on a background understanding of the literature related to DM. Further, in this paper, I will explore experiences in the response to the Fukushima nuclear disaster. This study will have broad social implications for disaster infrastructure, but it also will have more specific implications for the development of disaster curricula. The background laid out in this chapter will be examined in greater depth in Chapter 2, and that will lay the foundation for the study.

Chapter 2: Literature Review

Introduction

The field of DM is still developing. As an interdisciplinary topic, DM allows for a broad scope of research. In achieving that broad scope, however, it becomes necessary to incorporate information from a broad range of sources. While this incorporation of a broad range of studies does lead to some overlap between fields requiring clear, DM-specific, definitions and refinements, there are still many gaps in the literature needing to be filled.

One such gap is related to the role of students as response workers. There have been many reports that incorporate aspects of universities aiding in the responses to disasters (e.g., Fujishima & Suematsu, 2012; Fuse, Igarashi et al., 2011; Fuse, Shuto et al., 2011; Ishii, 2011; Kapucu & Khosa, 2013; Kato et al., 2012; Koyama et al. 2011; Monzen et al., 2011); however, none of these reports specifically address the role of students in the disaster response. As disasters go beyond the capacity for local communities to respond (Lateef, 2011, p. 289) and the number of disasters continues to increase (Kagawa & Selby, 2012, p. 208), the incorporation of graduate students in response work is likely to increase. Without a fundamental understanding of how students experience and react to involvement in disaster responses, it is difficult to endorse this path.

To understand this phenomenon, it is essential to begin with the limited scope of a single disaster, in this case the Fukushima nuclear disaster. To move forward into this understanding, a broad understanding of DM research and the specific disaster is

important. Furthermore, the current and historical literature around the theoretical foundations is essential to understand the important aspects of the phenomenon in order to lay a foundation for understanding the experience of students involved in the response efforts.

Literature Search Strategy

In order to be as comprehensive as possible, I designed a six-stage review process: personal foundation, broad search, emergent theme search, secondary broad search, determined themes and late emergent themes, and specific authors and journals. The first stage of the process was to go into all previous research I had done in order to find articles that might be useful. The next stage was to employ a broad search. Using Google Scholar, I searched the terms *fukushima disaster medicine university* for the years 2011 forward. This search term had 1,250 results, of which I selected 21 as possibly useful for this paper. I then did a search for *disaster health empowerment* for the years 2008 forward, which yielded 17,300 results of which I selected 8. During this stage of the search I also looked for new key terms. Those key terms were used in the third stage, emergent theme search. Each theme was searched using MEDLINE with Full Text, CINAHL Plus with Full Text, and PubMed. Searches from these key terms yielded some more key search terms that were then cycled into this stage of the search. During this stage, 1,796 articles were yielded, 14 were selected. The fourth stage was a secondary broad search employing Thoreau advanced search, SAGE Premier, and ProQuest Central, to search the terms *disaster medicine university*. These searches yielded 1,040,149 results, of which 29 were selected. The fifth stage reviewed themes that emerged as the result of

the secondary broad search as well as themes thought likely to yield information specific to certain areas of this paper. The different terms were matched with appropriate search engines, such as Health & Medical Complete, ERIC, Education Research Complete, SAGE research methods online, and CINAHL & MEDLINE simultaneous search. The search terms yielded 2,358 results, of which 15 were selected. Before the final stage, all previously selected items were examined, and authors or journals that were recurrent or strongly linked to my themes were selected for specific searches. All journals were searched for the past 3 years, and authors were searched using ProQuest Central for the past 5 years, resulting in the selection of an additional 18 articles.

During the review of these articles, articles with weak methodology or association were removed from inclusion.

Theoretical Foundation

This topic adopts aspects from a broad range of fields, requiring a broad range of theories in order to formulate a foundation. As such, there was a need to employ a range of theories in order to explain the phenomenon.

The first theory necessary to understand was that of empowerment. A major issue faced by those marginalized by cultures is the ability to identify what is and is not acceptable; through development of the critical faculty, those areas can be identified then defined, or redefined, as necessary to empower the marginalized (Freire, 1973). The multifaceted concept of empowerment is often broken down into its constituent fields; in order to move towards a broader empowerment movement, it is necessary to examine these constituent fields and amalgamate them into a broader movement aimed at the

overall empowerment of society (Bergsma, 2004, p. 161). This theory helped to understand the goals of learning and policy; however, it was also necessary to understand a concept of learning, such as cognitive content engagement. Cognitive content engagement is the theory that information is learned through processing and that engagement at a deep level is necessary (McLaughlin et al., 2005, pp. 9-11). Understanding the theory of cognitive content engagement helps to explain a concept of learning and how real-world experience can translate into learning.

The next layer to understand was that of disasters themselves. Disasters lend themselves to an understanding via general systems theory. Systemic awareness is derived from the ability to conceptualize the interconnections that formulate a system (Ison, 2008, p. 140). However, as disasters are complex, it was important to think beyond the concept of a system. When managing a disaster, it is important to think about systems of systems, rather than to focus on each individual system (Embrey, Clerman, Gentilman, Cecere, & Klenke, 2010, p. 300). This lays the foundation for a broader understanding of the interactions likely to occur within a disaster response.

Finally, it was important to understand how to judge actions, ethics. To begin to understand modern ethics, it was important to understand utilitarianism; utilitarianism is, broadly, the concept of the greater good (Mill, 1863). Utilitarianism was not only the most philosophically sound modern ethical system; it was also the foundation of the principles upon which health ethics are based.

Empowerment

Empowerment is based on the realization that there are power imbalances in society, and those imbalances represent injustice. Therefore, the purpose of empowerment is to enable people and communities to make positive change (Downey, Anyaegbunam, & Scutchfield, 2009). There are two critical aspects of empowerment: control and critical thinking. In order for empowerment to take place, there needs to be a psychological sense of personal control (Chang, Liu, & Yen, 2008, p. 2782). The issue then becomes how that sense of control can be facilitated, or developed, leading to the importance of critical thinking. A noncritical view of society cannot illuminate what change is necessary (Freire, 1973); therefore, critical thinking is the key component for empowerment to take place (Bergsma, 2004; Freire, 1973; Green, 2008). For individuals to engage in change, they must first take steps to understanding what changes are needed; once needs are understood, the ability to act on those needs must be facilitated (Downey et al., 2009, p. 33). This is essential for the efficient management of complex organizations as there is a greater need for autonomy that requires empowerment to be effective (Chang et al., 2008, p. 2782). In these regards, empowerment is essential for education, organizations, and society.

Empowerment has also become a prominent theory within modern health literature. Empowerment in modern health literature can be dichotomized into community-oriented, Freirian empowerment, and individual-oriented, libertarian, or neoliberal empowerment (Kendall, 1998, p. 1). Individual-oriented empowerment is less about empowerment than shifting responsibility without shifting power; in this system,

the stigmatization of the unhealthy works as an enforcement mechanism (Schee, 2008, p. 868). In this regard, individual-oriented empowerment can be seen as separate and opposite of community-oriented empowerment as it is a shift in responsibility rather than a shift in power. It is essential to focus on power balance as in the traditional health care framework, there is an imbalance in the patient-provider power relationship (Johnson, 2011, p. 265); this imbalance can be seen as analogous in many ways to the victim-responder power imbalance in response efforts. Understanding and overcoming this imbalance is, therefore, essential to an empowering approach to DM. Going further, empowerment is not only a goal within itself, it is also a foundational aspect of health; a paucity of power leads to a paucity of health (Bergsma, 2004, p. 161). Modern health literature rightly focuses on empowerment, not only for individual health, but also for public health.

Communities can be seen as a system of social networks. Those social networks provide a foundation not only for psychological support, but also for empowerment (Ganapati, 2012, pp. 422-423). However, not all empowerment efforts are equal. Empowerment efforts targeting women have a disproportionate impact on community empowerment over general empowerment efforts (Varkey, Kureshi, & Lesnick, 2010, p. 71). In supporting the empowerment of women, a new framework of gender mainstreaming (Alston, 2014) has been introduced. Gender mainstreaming is the shift from policies designed to support women directly towards an approach that addresses institutionalized sexism within culture, the law, and public institutions (Alston, 2014, p. 289). Disasters can be the catalyst for empowerment. The intersection of transnational

and local organizations during disaster response increases the reach of empowerment-focused groups to help restructure institutions with fundamental issues averse to empowerment (Alston, 2014, pp. 292-293). This can begin a groundswell towards empowerment. Working from the ground up is the social path to change outlined by Freire, empowerment education can change the foundations of communities (Wiggins et al., 2009, p. 13), leading to political change from the ground up (Breton, Richard, & Gagnon, 2007, p. 353; Green, 2008, p. 454). As such, empowerment is not only a theory of power balance, education, and health, it is also a theory focused on social change.

Cognitive Content Engagement

Cognitive content engagement is a theory about how humans learn. The two key factors to learning under the cognitive content engagement model are cognitive engagement and subject matter knowledge (McLaughlin et al., 2005, p. 3). Cognitive engagement is the degree to which students consider the content, the subject matter. The most productive activities are those that are challenging but achievable (Kong & Hoare, 2011, p. 310). By providing more difficult tasks, teachers can improve students engagement in activities. This is important because information is learned through processing, which involves the repetition and the formation of associations (McLaughlin et al., 2005, pp. 9-11). Engagement increases the time on task for processing.

Another aspect of cognitive content engagement is the need for contextualization of knowledge, connecting activities to what was studied and connecting new knowledge with old (Kong & Hoare, 2011, pp. 310-311). Involvement in projects aimed at solving real-world problems can aid students in the development of their comprehension of

theoretical constructs (Jayawardana & O'Donnell, 2007, p. 680). The real world provides context within knowledge can be associated. When engaged in the management of recovery in Sri Lanka, graduate students were able to apply existing knowledge and also develop necessary interpersonal skills (Jayawardana, & O'Donnell, 2007, p. 692). The students were able to incorporate knowledge from the classroom into a real-world context and also incorporate new skills into their contextualized knowledge.

General Systems Theory

General systems theory provides an epistemological mindset for understanding and analyzing the world. General systems theory begins with an understanding that open systems require a more complex understanding than closed systems (von Bertalanffy, 1969, pp. 39-40). Understanding the epistemology being used allows for an understanding of the conclusions likely to be derived (Ison, 2008, p. 148). Essential in understanding systems is the epistemological loop between the observer and the observed (Ison, 2008, p. 145); in understanding the social world, the positivist epistemology applied to engineering must give way to a social constructivist epistemology (p. 148). This does not mean abandonment of either epistemology, just an acceptance that the significant information in a social system is based on the social constructs derived from that system. Dichotomization between these two epistemological approaches is both unhelpful and unnecessary, it is better to employ the epistemology best for the situation rather than choosing one (Ison, 2008, p. 148). In the case of systems, systems are social constructs. These social constructs represent a format for interaction between individuals in an inter- or intra-group context. A fundamental aspect of general systems theory is the

concept of context; nothing happens in a vacuum (Ison, 2008, p. 145). The interactions between group members are based on the assumption of the reality of the socially constructed systems. Taking this into consideration, the incorporation of empowerment into a system creates a cycle of empowerment, which yields improvements in the present and the future (Chang et al., 2008, p. 2789), incorporating a power-balance context into a social construct.

One of the primary strengths of general systems theory is that it works well in describing complexity. Complexity is a reality of systems, especially systems designed in relation to DM. While there is the assumption that complexity of systems can lead to them becoming less sustainable (Kapucu & Garayev, 2013, p. 317), this is not met out by data regarding the experiences of individuals in agencies responsible for emergency response (pp. 320-321). However, complex systems require a different concept of management. Incorporation and management of complexity in social systems requires the utilization of social constructivist epistemology (Ison, 2008, p. 151). The complexity of systems is the manner in which systems account for organizational weakness. The Civilian-Military Contingency Hospital System in the United States is an example of a partnership designed to integrate different systems to overcome individual weaknesses (Brandt, Mayer, Mason, Brown, & Mahoney, 1985, pp. 456-457). This can also work at an intraorganizational level, incorporating elements from other organizations to strengthen organizations from within. The incorporation of risk management into the broader systematic framework can yield powerful results in preventing and mitigating risk while, at the same time, lending itself to institutions being more capable of meeting

other strategic objectives (Brewer & Walker, 2011, p. 171). External elements incorporated within a system may increase complexity, but yield benefits.

The weakness of general systems theory is rooted in the reality that systems are social constructs. This can be exceptionally problematic for the types of ad hoc networks formed in the response phase of a disaster. The development of a collective mindset, unified focus on the goals of the system over the goals of the individuals, is useful to system efficacy; in ad hoc networks there is little time to develop this mindset; however, it requires increased focus on intersystemic social capital and communication (Kapucu, Arslan, & Collins, 2010, p. 226). In order to manage this shortcoming information becomes the foundation for communication and trust. The dissemination of information between agencies is a key component for the success of a system in handling disasters (Caruson & MacManus, 2011, p. 349). Thus, information becomes the key to developing the social construct necessary to contextualize interactions and develop the social capital necessary to work efficiently towards the newly unified focus.

Utilitarian Ethics

Ethics is a foundational aspect of all human endeavors. Medical ethics employ a principle approach, focusing on key principles to define ethical decision making. Four key principles of medical ethics are beneficence, nonmaleficence, justice, and autonomy (Lateef, 2011, p. 290). These seemingly disconnected principles are all interconnected through a theoretical framework. This theory is utilitarianism, the concept of doing the greatest good for the greatest number of people (Mill, 1863). Without such a guiding

theory it is impossible to determine what is right, or wrong, in a rational manner. This is especially important following disasters.

Disasters are complex and fluid scenarios which require decisions to be made at a rapid pace. While there are many difficulties in applying normal ethics to the complex situation of a disaster, it is essential to maintain the core ethical principles and have strong fidelity to those principles (Lee, 2012, p. 858). In order for this to occur, ethical considerations must begin before the disaster; it is essential that response workers have a foundation in ethics within their training (Lateef, 2011, p. 291). Without an understanding of the principles and the ethical reasoning behind the principles, fidelity to those principles becomes untenable. And while there is a general requirement that physicians, even without contractual obligations to the patients, have an ethical duty to aid (Akabayashi, Takimoto, & Hayashi, 2012), it is important to realize that the duty to care extends beyond victims and to the response workers themselves (Lateef, 2011). A rescuer in need of rescue or a physician who is ill adds to the burden of response rather than aiding. As such, in addressing the ethical obligations, it is important to consider the risk involved in undertaking said burden (Akabayashi et al., 2012, p.698). Therefore, reliable and trustworthy information is the foundation on which an assessment of risk, and thus an assessment of ethical responsibilities, is based (Akabayashi et al., 2012, p. 698). While a DM response lays forth complex ethical issues, it is essential to understand that it is far from an aethical scenario.

Further, in regards to disaster, there is an ethical responsibility to learn from disasters in order to prevent or mitigate future disasters. However, research in the disaster

setting needs to take into account the research participants, particularly taking care to understand the special vulnerability inherent in being the victim of a disaster (Lateef, 2011, p. 291). Following a disaster, the vulnerable become more vulnerable due to lack of control over the distribution of resources (Lee, 2012, p. 857). This lack of control and special vulnerability requires special precaution in attaining consent. Having plans for research ready in case of a disaster is prudent, but those plans need to be fluid as no two disasters are identical.

Disaster Medicine

Disasters are an international concern. There is an overall shift in the understanding of public health from a national to a global interest (Licini, 2011). Local disasters cause problems that can affect other nations, even beyond humanitarian concern. The destruction of manufacturing plants can cause disruptions to drug supply outside of the disaster zone (Mori, Hasui, Tanimoto, Matsumura, & Kami, 2012, p. 609). While the humanitarian concerns should take ethical precedence, the financial impact is more tangible. International efforts have been undertaken to promote disaster preparedness. The United Nations Hyogo Framework is the basis of priorities set forth in many papers (e.g., Licina, 2011); it identifies five priorities: ensuring prioritization of disaster risk reduction; identification, assessment, and monitoring of risks; evidence-based education towards resilience; reduction of risk; and increased preparedness (UN, 2005, p. 6). This framework focuses a great deal on preparedness. It is important to note that a disaster is the result of a hazardous event overcoming preparations; thus, preparations can prevent or mitigate disasters (Kagawa & Selby, 2012). However,

preparedness needs to be informed. The United States government is a major contributor to disaster preparedness and response; however, the money could be better spent if there were a comprehensive assessment of preparedness needs (Licini, 2011, pp. 1208-1209). Understanding the needs of communities is essential, but not sufficient.

In order to best handle a variety of disasters, it is important that there is integration across disaster plans, focusing on a more general approach to any disaster rather than focusing specific plans for a variety of specific disasters. This approach requires, also, that natural and human-induced disaster plans be integrated (Caruson & MacManus, 2011, pp. 347-348). In understanding the impact of disasters, it is important to address commonalities across disasters. First-responders tend to have a better understanding of the convergence of factors than officials in more generally focused agencies (Caruson & MacManus, 2011, p. 362). However, there is a need for a variety of perspectives. The primary risks following a disaster sometimes overshadow other aspects of health; in particular, occupational health is not considered sufficiently for those working on response activities or working in or near the disaster zone (Mori et al., 2013, p. 9). Following hurricane Katrina, chronic conditions and routine care accounted for a significant amount of necessary care (Millin, Jenkins, & Kirsch, 2006, p. 453). In addition, health issues, including stress, do not dissipate even as communities move towards normalcy. Three years after the tsunami in the Indian Ocean there were still women with issues related to the disaster (Wickrama & Ketring, 2012, p. 284); long-term care related to rehabilitation of survivors and to increase physical functioning were also necessary following the 2008 earthquake in China (Zhang, Reinhardt, Gosney, & Li,

2013, p. 6). In order for the short and long term needs to be met, communities need to be incorporated into disaster planning in order to build social capital and to match the plans to the localities in which they occur (Sabur, 2012, p. 38). This complex system of needs, requiring international and local organizations, requires functional networks to account for those needs.

The nature of the disaster tends to require the formation of networks in an ad hoc manner. The lack of experience and negotiated terms can lead to problems with interactions in ad hoc networks (Nolte & Boenigk, 2013, pp. 148-149). Systems formed to handle disasters are often ephemeral in nature, dissipating once the mutual need for interdependence towards shared goals dissipates (Kapucu & Garayev, 2013, pp. 316-317). This dual nature of emergence and transience can lead to a lack of motivation to develop social capital between organizations. However, local agencies can provide a foundation to countermand this deterrent. Following a disaster there needs to be strong integration across local agencies with well-defined roles in addition to coordination with first responders (Caruson & MacManus, 2011, p. 348). That foundation can be built on to form larger networks. Large-scale systems are necessary to handle the surge of medical needs caused by major disasters (Brandt et al., 1985, p. 461). Such large systems require a great deal of communication and social capital to perform well. In responding to disasters, it is possible that cliques will form within organizations; cliques are portions of organizations dealing with a specific aspect of the problem, their formation can improve internal clique efficacy at the expense of communication and collaboration outside of the

clique (Kapucu, Arslan, & Collins, 2010, p. 236). This tendency towards complexity requires management to be efficient.

The natural tendency is to turn towards a centralized leadership. However, top-down approaches to disaster management often lead to inequality (Nikku, 2013, p. 54). Furthermore, the complexity of response requires a greater reliance on decentralized systems, utilizing less central authority and increasing autonomy (Kapucu, Arslan, & Collins, 2010, p. 228). Balancing the needs for integration and autonomy becomes the key to an efficient network. This is especially important if the need for continued support becomes evident. While disaster-related networks tend to be short-lived, in cases where continuing needs arise, they can demonstrate longevity (Zhang et al., 2013, p. 7). Thus, a foundation of strong integration and mutual trust can be useful beyond the response phase of the disaster.

Disaster Cycle

The management of disasters requires an understanding of the disaster cycle: mitigation, preparedness, response, and recovery (Deshpande, 2011, pp. 98; Kapucu, Arslan, & Collins, 2010, p. 227; McCann, 2009, p. 331; Sabur, 2012, p. 38). While there are differences in the specific terms used, researchers tend to agree on the broad pattern and its cyclical nature. In addition, the phases of a disaster are interconnected and interdependent; each is related to and incumbent on the others (Deshpande, 2011, pp. 97-98). The phases build on and into each other, creating a framework for protection.

Before disaster strikes, there are two essential phases. The first predisaster phase is mitigation. Building of physical and regulatory infrastructure is the purpose of

mitigation (Kapucu, Arslan, & Collins, 2010, p. 227). This infrastructure defines the system which can emerge and the resources those systems can utilize. The next predisaster phase is preparedness. Training and monitoring of personnel fall into the preparedness phase (Kapucu, Arslan, & Collins, 2010, p. 227). While preparedness is seen as fundamental, the evidence on its effectiveness is limited (Lund et al., 2011, p. 233). However, this limitation of current evidence should be considered in the context of a variable that is difficult to examine, rather than evidence of a lack of interest or significance. Also, spending on risk reduction generally pays dividends in the aftermath of large disasters (Albrito, 2012, p. 294). These two phases are in many ways concurrent and ongoing before disasters. Mitigation focuses on the physical and regulatory resources while preparedness focuses on the human and informational resources.

Following a disaster there are two phases which are more sequential than the predisaster phases but can have some overlap. The response is the immediate actions designed to address the disaster's impact (Kapucu, Arslan, & Collins, 2010, pp. 227-228). The response phase can further be broken down to a set of five Cs to be effective: comprehend, communicate, cooperate, coordinate, and critique; comprehension requires an understanding of the problem, communication is about sharing that understanding with the at-risk population and organizations capable of aid, cooperation is the seeking of aid from capable groups, coordination is the establishment of a chain of command and organization of resources and activities, and critique, which leads to the recovery phase, is about assessing efforts in process as well as in retrospect (James, Subbarao, & Lanier, 2008, p. 560). It is essential that the recovery phase incorporates a critique, but it is

equally important that the critique be focused on learning (Fitzgerald et al., 2012, p. 229). The recovery phase can be seen as the postdisaster return to normalcy, and transition to predisaster phases.

Communication

A key component of a disaster response is communication. Communication provides the foundation for trust, that trust is essential for effective collaboration in order to handle a disaster in an effective manner (Kapucu, 2006, p. 218) and to support ad hoc networks (Nolte & Boenigk, 2013, p. 162). Information needs to be collected and shared between organizations. However, there is also the possibility of too much information leading to confusion. Information alone is useless unless it can be formulated into a usable form (Kapucu, 2006, p. 208); in response to an overabundance of information, Kaiser Permanente utilized a funneling approach to improve information transfer through consolidation of messaging (Thompson, 2011, p. 127). This facilitated the sharing of information in a manner which maintained organization.

The utilization of information technology improves the sustainability of interorganizational interactions during a disaster response (Kapucu & Garayev, 2013, p. 320). This shift to improved technology creates both opportunities and vulnerabilities. As information is the key to an effective response, there is a need for the hardening of information infrastructure (Fuse, Shuto et al., 2011, p. 400). The destruction of information infrastructure complicates response efforts; following the onset of a disaster, the first goal needs to be information acquisition (Fuse, Igarashi et al., 2011, p. 404). This can take many forms; the first is to utilize a greater variety of communication modes. The

emergence of the internet's capability to serve its original intent, as an emergency communication network, provides a new resilience to communication networks if it is effectively used (Kapucu, 2006, p. 220). Furthermore, social networking sites may also be useful in providing ad hoc information infrastructure; following the Great East Japan Earthquake 2011, the director of a child welfare facility in Miyagi prefecture managed to connect to firefighters via a complex path, which included Twitter, saving numerous children (Fuse, Shuto et al., 2011, pp. 399-400). On the other hand, the internet is not a panacea. It is essential to establish alternative communication methods including technological improvements to existing methods, such as satellite phones (Ushizawa et al., 2013). A broader, more hardened information infrastructure is an essential aspect for future disaster plans.

Information needs to flow within and between organizations; however, information must also be provided to the community. Because there is a need for support from community members, the need to communicate the immediate purpose and long-term intent of activities by response workers is essential (Haraoka et al., 2012). Furthermore, this complicates international aid efforts. The lack of a shared language can make interactions between organizations attempting to collaborate more difficult (Kapucu, Arslan, & Demiroz, 2010, pp. 455-456), it can also impact the ability to interact with the community hit by the disaster. This is the foundation of social capital, which, in turn, can lead to improved information gathering capabilities. The ability to use available information channels can be facilitated through the built up social capital of organizations (Kapucu, 2006, p. 210). Communication was a major issue following the Fukushima

nuclear disaster. Lack of knowledge about radiation in relation to health among the general public makes it difficult to explain the nature of the situation to the public (Fitzgerald, 2012, p. 232). Therefore, it is essential to incorporate an aspect of teaching in the communication between response organizations and affected communities.

Community Resilience

A growing concern in regards to disaster mitigation and preparedness is community resilience. The foundation for disaster preparedness and mitigation, particularly in pastoral regions, is resilience (Ogato, 2013, p. 26). A key aspect of resiliency is empowerment. Empowerment of communities allows communities to advocate for the resources needed while also promoting equality, efficacy, and autonomy (Wiggins et al., 2009, p. 19). The incorporation of empowerment into the resilience framework is essential for the preservation of social justice. The key aspect of resilience is the ability of communities to adjust to change in a manner that accommodates social justice (Ireni-Saban, 2012, pp. 4-5). The accommodation of social justice requires an inclusive approach. If there are members of a community who are marginalized, efforts at resilience with a foundation in social justice will fail (Ireni-Saban, 2012, p. 8). As such, the social foundation of resilience is empowerment with a focus on inclusion.

Inclusiveness can be used to describe the social justice imperative; however, it is also essential in the disaster plan organization. Resiliency is best developed through an inclusive approach, making preparations that address a variety of possible disasters rather than preparing separately for each type of possible disaster (McCann, 2009). Rather than focusing on a plan for floods, a plan for droughts, a plan for tropical storms, and a plan

for volcanoes, it is better to have a single plan capable of addressing all of these issues with the flexibility to address each issue well. Inclusiveness, however, also requires an inclusiveness of different aspects of health, particularly mental health. The implementation of programs to aid in psychological health following a disaster can improve the long-term resilience of communities and organizations (Guenther, 2012, p. 311). That push towards psychological well-being can be aided by the development of social cohesion. The combination of a sense of cohesion and social capital leads to greater psychological and community resilience (Haraoka et al., 2012, p. 5). For this social cohesion to be fully effective, however, there needs to be training towards community resilience. A key aspect of resilience is competence, communities need to be competent, but organizations need to assure that competence exists (Ireni-Saban, 2012, pp. 7-8). Thus, the need to be competent and to communicate that competence to local and nonlocal organizations is foundational. In the Philippines, local government training related to disasters and community-based early-warning systems are aimed at proactively reducing the risk of disasters (Yumul, Cruz, Servando, & Dimalanta, 2011, p. 373). This incorporation of communities, incorporating training, is emblematic of the concept of community resilience.

From a governmental viewpoint, however, it is important to understand how to implement or facilitate resilience. The centralization of resources for disaster resilience has a negative impact on local resilience; resources must be allocated and utilized at a local level incorporating feedback from residents as well as local governments (Albrito, 2012, pp. 296). Unfortunately, the nature of disasters is that they overwhelm local

resources; as such, local and regional resources are likely to become overwhelmed even if not destroyed by the disaster itself (Brandt et al., 1985, p. 456). Balance is key. While the top-down approach can easily lead to marginalization, a bottom-up approach can easily become piecemeal and disorganized; therefore, there needs to be an approach that utilizes the positive aspects of both approaches to provide comprehensive coverage without marginalization (Ireni-Saban, 2012, p. 2). While community resilience programs are essential, some degree of oversight and standardization helps to promote effective integration between local and national efforts (Embrey et al., 2010, pp. 299-300). The purpose of standardization is for the facilitation of national assistance. Having each locality superspecialized may create more ideal local plans; but, it will weaken interaction between local and national response efforts. However, in developing local resilience, it is necessary for communities to have an equal seat at the table; knowledge and social understanding at the local level require input from the communities being engaged (Ireni-Saban, 2012, p. 6). An example of this balanced approach is demonstrated by flooding preparedness in the UK which incorporates aspects of national response, but focuses on individual and local preparedness (Wilby & Keenan, 2012). Understanding that communities are an important asset for mitigation and preparedness, leading to response and recovery, allows for a more robust response.

Unfortunately, resilience will not solve all problems. The underside of community resilience is that the activation of social resources may overwhelm the management capacity of agencies managing the disaster response (LaLone, 2012, pp. 220-221). Furthermore, when considering resilience at the organizational level, there are some

motivational conflicts leading to different levels of resilience. Nonprofit and public organizations being better prepared for disaster than private institutions; it is, therefore, preferable to focus on nonprofit and governmental agencies when improving the resiliency of communities (Chikoto, Sadiq, & Fordyce, 2013, pp. 401-404). Focusing specifically on governmental organizations, intragovernmental coordination is an essential aspect of the financial management necessary to properly prepare communities to be resilient in the face of disasters (Caruson & MacManus, 2011). Again, this focus needs to also be local. Local organizations tend to be more effective and well-coordinated than external agencies during response making it imperative that local resilience be fostered (Kapucu, Arslan, & Collins, 2010, p. 240). This consideration also needs to go beyond the normal scope of agencies already designed for disaster response. While some organizations already exist to aid in disaster response, there are also groups that will alter their purpose or emerge as the result of a disaster in order to aid in the response; it is essential to coordinate these groups in a manner that utilizes the strengths of all involved (LaLone, 2012, pp. 222-223). In order to develop resilient communities inclusivity is essential, but so is persistence. A sustained interest in disaster mitigation must be combined with government agencies capable of enforcing the necessary regulations in order to promote resilience (Albrito, 2012, pp. 293-294). Through this inclusive and sustained approach, resilience can become a more powerful tool in preventing and addressing disasters.

At-Risk Populations

The recurrent theme of social justice and inclusion requires the acknowledgement of the special needs of at-risk populations. While the ethical decisions faced by response workers are similar to those in everyday life, there is a greater threat to those that are more vulnerable (Lateef, 2011, p. 290). In addition, social capital, often seen as being useful in fighting social injustice, can have a negative impact. The formation of social networks, while empowering and psychologically supportive, can also have a negative aspect through the reinforcement of stereotypes (Ganapati, 2013, p. 82). Thus the very tools needed to support social justice can work against social justice. Therefore, there is a need to take special consideration to organizational and regulatory roles. In the mitigation stage, it is possible that the focus on disaster mitigation can supersede concerns over at-risk populations, leading to policies that harm at-risk populations by exclusion (Roberts, 2013, p. 388). In order to address issues in an inclusive manner, I will incorporate some literature on specific issues for specific at-risk groups.

A key group requiring special consideration is women. Because of the nature of modern societies, male-oriented power and social structures, women are at a distinct disadvantage and face increased risk following a disaster (Juran, 2012, p. 3). Women are more likely to die in disasters; while biological differences related to strength or endurance are often noted, these differences cannot account for the size of the differential (Juran, 2012, pp. 4-5). Furthermore, there are certain forms of harm more likely to focus on women. The risk of sexual violence against women is increased in postdisaster situations that include population displacement (Juran, 2012, p. 21). Not only are women

more likely to suffer physically and mentally as the result of a disaster, but disasters may also lead to future limitations because women are more likely to drop out of school as the result of a disaster (Alston, 2014, pp. 288-289). This lack of continued education feeds into a negative social spiral. While it is common for women to be assigned the gender role of caretaker, this position is often given less value leading to a situation of burden without benefit (Juran, 2012, p. 4). In turn, this devaluing increases risk. Following disasters, women are more likely to become victims; combining gender with low socioeconomic status exacerbates both issues (Ganapati, 2013). As such, it is essential for policy makers to address gender roles when formulating policy.

A group often used to visually explain disaster through photography is children. Children pose a peculiar situation, wherein the age of the individuals is utilized to provide a cause for disenfranchisement; providing information to and consulting with children is essential for the protection of children following disasters (Nikku, 2013, p. 63). Thus, children face a double-risk. Children face increased risk due to disasters but also lose their combined voice towards self-advocacy. Incorporating children in the discussion of policy is important moving forward.

There are also individuals who are marginalized based on other minority status. Those groups face increased animosity following a disaster. While social pressure may serve to suppress racial animosity in normal periods; such racism may reemerge in periods of crisis (Roberts, 2013, p. 408). This can be seen at the individual level, but also at the policy level. While minorities often suffer disproportionately from disasters, they also tend to receive less support (Rivera & Miller, 2007, pp. 515-516). As racism can

take a more subtle form masked by other intents (Roberts, 2013, p. 408), it is important to assess policies separate from their intent. Racial minority status can also be exacerbated by other intersectional issues. Language can also become a barrier, leading to an even greater degree of risk associated with disasters (Nepal, Banerjee, Perry, & Scott, 2012, p. 266). This barrier marks individuals racially and also limits access to information. Addressing the social issues behind racial animosity will require time; however it is essential to begin to address the issues of racially biased policy or policy implementation.

Another group of particular concern is patients undergoing continual care. Special-needs patients require special consideration during response including planning for caregiver continuity (Mace & Doyle, 2011, pp. s60-s61). Disasters are disruptions to the normal order of a community. For some this is an inconvenience, for others, there can become a matter of life and death. For special-needs patients, it is essential that caregiver continuity be given an elevated status in order to prevent unnecessary harm.

Finally, there are special areas of consideration tied, in part, to socioeconomic status. This can be general or specific. People can also enter at-risk populations due to occupation such as the temporary workers at nuclear power plants (Shrader-Frechette, 2012, p. 135); following the Fukushima nuclear disaster, some plant workers experienced direct verbal discrimination based on their employment; this discrimination led to a higher risk of psychological repercussions (Shigemura, Tanigawa, Saito, & Nomura, 2012, pp. 667-668). This situation saw the intersectional aspects of members of a low socioeconomic status group being combined with blame for the disaster. As unempowered workers within the power plants, the workers were already at greater

personal risk than the general society (Shrader-Frechette, 2012, p. 135). This risk, as the result of the disaster, became compounded by societal misperception of the responsibility of these workers. It is essential that at-risk populations are empowered and incorporated when addressing disaster plans.

Climate Change

The world is changing, and part of that change is anthropogenic global climate change. There is an increased need to incorporate climate change adaption with DM to improve the efficacy of both (Sauerborn & Ebi, 2012, pp. 5-6). This is particularly important as the number of annual disasters has already doubled over the last decade, and the situation is going to get worse (Kagawa & Selby, 2012, p. 208); while specific events cannot be directly attributed to climate change, the frequency and intensity increases can be correlated to anthropogenic climate change (Sauerborn & Ebi, 2012, pp. 3-4). This shift in climate has a broad range of climate and epidemiological results. Heat-related power outages, water-related weather disasters, and regionally-new disease outbreaks are likely to accompany the shift in global temperatures (Hess, Heilpern, Davis, & Frumkin, 2009, pp. 783-787). There is also an increased risk of disaster resulting from the combination of climate change and rising populations (Alston, 2014, p. 288). This ongoing, increased risk requires global action.

As a result of climate change, the rise in risks related to weather-related disasters is superseding growth in economically developed nations. This situation is the foundation of the Hyogo Framework for Action, a plan to identify the areas and principles necessary to promote resilience (Albrito, 2012, p. 292). This is an aspect of societal adaptation.

Societies have adapted to climate shifts in the past, but the need for an increased pace alongside a growing acceptance of the need to incorporate social justice into adaptation models is making adaptation planning of greater importance (Wilby & Keenan, 2012, p. 350). Some areas are harder hit than others. From 2004 through 2008, the Philippines suffered alternating years of extreme rainfall events and droughts, demonstrating the concept of weather event intensification (Yumul et al., 2011, pp. 368-371). As some of the hardest hit areas are areas less able to respond, it is important to address climate change in terms of social justice.

Fukushima Nuclear Disaster

The Fukushima nuclear disaster was part of a complex disaster involving an earthquake, a tsunami, and multiple nuclear reactor accidents. While the most frequent cause of death following the earthquake was drowning (Fuse, Igarashi et al., 2011, p. 403) the nuclear disaster posed a unique set of issues not common in modern disasters. Understanding the nuclear disaster at Fukushima is necessary for understanding the role of nuclear power in the world, and the preparation necessary to mitigate future disasters (Funabashi & Kitazawa, 2012, p. 11). Furthermore, while the Fukushima nuclear disaster was part of a complex disaster, it was complex in and of itself. The disaster at Fukushima Daiichi had multiple aspects: multiple meltdowns, hydrogen explosions, and radiation leaks (Funabashi & Kitazawa, 2012, pp. 9-10). Many workers at the Fukushima Daiichi nuclear power plant were temporary workers already in high-stress and high-radiation-exposure positions (Shrader-Frechette, 2012, p. 135); this situation may have contributed, along with lack of training or up to date disaster planning, to the inability of employees at

the plant to act appropriately following the disaster (Funabashi & Kitazawa, 2012, p. 13). Perhaps the most attention was paid to the role of radiation in the disaster.

One lesson about Fukushima is that government nuclear power oversight is necessary, even when power stations are privately owned and run (Funabashi & Kitazawa, 2012, p. 16). Following the disaster at Fukushima, there was a large amount of radiation leaked. Measurements of this radiation showed that it was significant and there is the possibility that there will be an increased risk of cancer in the population (Anzai et al., 2012). Specifically, the disaster at Fukushima led to the release of several radioactive isotopes, iodine 131 in particular; iodine 131 is implicated in thyroid diseases including thyroid cancer (Fitzgerald et al., 2012, p. 131; von Hippel, 2011, pp. 28-29). Furthermore, there was a great deal of uncertainty related to the levels of radiation. This was complicated by the fact that the amount of radiation in affected areas was not predictable based on distance from Fukushima Daiichi power plant alone (Monzen et al., 2011, p. 2). This increases the need for consistent monitoring and sharing of information with the public. However, the actual level of exposure to internal ionizing radiation appears to be fairly limited (Tsubokura, Gilmour, Takahashi, Oikawa, & Kanazawa, 2012, pp. 669-670). In the limited studies available at this point, there is no apparent damage yet. Upon thyroid ultrasound examination of 38,114 individuals under the age of 18 at the time of the Fukushima nuclear disaster, none were found to have malignant tumors (Yasumura et al., 2012, p. 380). This is expected as the long-term implications will take some time to become apparent. There are some impacts of the radiation already being felt. The most significant threat from radiation following the Fukushima nuclear disaster was that of

psychological dread, the persistent fear of an invisible threat (von Hippel, 2011, p. 33). This psychological reaction requires serious consideration moving forward which could have been partially mitigated through better information infrastructure.

The information infrastructure was damaged by the lack of electricity and physical damage to the grid. The key issue with providing assistance was the lack of an information infrastructure to allow communication between the affected area and aid workers (Fuse, Igarashi et al., 2011, p. 404). The only manner in which information could initially be gathered on the extent of injuries was through direct visual confirmation (Fuse, Shuto et al., 2011, p. 399). This was mitigated over time through innovation and technology. The internet played a large role in communication networks, facilitating robust information exchange allowing coordination between hospitals within and without the disaster zone (Nagamatsu, Maekawa, Ujike, Hashimoto, & Fuke, 2011, pp. 2-3). This communication infrastructure was useful for response organizations; however, the communication with victims was problematic. A major mistake made following the Fukushima disaster was the failure to understand the disaster and communicate that information to response workers and the public (Ishii, 2011, pp. 152-153). In addition to a lack of information about radiation distribution and health implications, the confusion caused by other nations introducing conflicting evacuation zones created issues with social capital between the government and residents (von Hippel, 2011, p. 31). It is essential that agencies communicate between each other before sending out mixed messages to affected communities, in order to prevent confusion and promote trust.

The specific response to the disaster, like the disaster itself, was complex. One major component of that response was the use of DMATs. DMATs in Japan are small teams of medical and technical staff able to enter disaster areas by car or other means of transport to disaster areas; following the Fukushima disaster DMATs played a role in patient transit and medical assistance (Fujishima & Suematsu, 2012, p. 1). These groups provided aid and support across the disaster zone and were a positive aspect of the response. Emergency Planning Zones were in place to clarify the response pattern following a nuclear crisis; unfortunately, the sizes of the zones were insufficient to handle the scale of the disaster (Fitzgerald et al., 2012, pp. 29-231). These were initially followed by the government in order to have an organized and timely evacuation, before international controversy over the appropriate size of the zones. These aspects of mitigation and preparedness demonstrated both strengths and weaknesses of the infrastructure in place before the disaster.

The major cause of death following the Great East Japan Earthquake 2011, with accompanying tsunami, was drowning; this was in stark contrast to the pattern of injuries following the Great Hanshin earthquake, leading to some resources being initially misallocated (Nagamatsu et al., 2011, p. 2). In other words, some lessons learned were learned too well. On the other hand, other lessons were not sufficiently learned. It is important to note that, following Fukushima, DMAT responses still showed the need for primary care, but also that the preparations for primary care were insufficient (Ushizawa et al., 2013, pp. 4-5). These weaknesses in the infrastructure were informative, providing a basis for development of future plans.

During the response, there were many specific issues that needed to be addressed. Shortages of food were one of the primary concerns faced by response workers in affected areas; furthermore, the limited supply of gasoline made meeting this and other needs more difficult (Fuse, Igarashi et al., 2011, p. 402). This complication hurt some more than others. Elderly and individuals in need of care for chronic conditions were unable to have their needs met by underresourced hospitals, 282 or more died as a result (Nagamatsu et al., 2011, p. 3). Furthermore, the impact was felt beyond the disaster zone. A secondary impact of the crisis was the shortage of a number of pharmaceuticals to hospitals in Japan(Mori et al., 2012, pp. 608-609). This was partially caused by damage to pharmaceutical manufacturing plants; however, there is at least one case of a factory shut down due to lack of information regarding radiation levels (Mori et al., 2012, pp. 608-609). Overall this disaster had far-reaching effects.

Finally, Japan has a history with radiation. This creates an environment wherein the idea of radiation leaking is likely to have a greater significance than in other countries. In Japan following the earthquake, tsunami, and nuclear accident there was the direct psychological threat of those traumatic events, the persistent threat of radiation, the loss of loved ones, and displacement which, combined, presented a complex psychological impact requiring sufficient support (Shultz et al., 2011, p. 142). Furthermore, this psychological trauma and the threat of continuing low-level radiation exposure presented a difficult situation for children. Following the Fukushima nuclear disaster, it became essential to specifically address the issue of children; the two main issues that needed addressing were the persistence of stress-related mental illness and the

need to play while protecting children from low-level environmental radiation (Kikuchi & Kikuchi, 2012, pp. 26-27). To address both of these issues, an indoor play area was developed (Kikuchi & Kikuchi, 2012, p. 26). Encapsulated play areas allowed children a return to near-normalcy until the threat sufficiently subsides.

Response Workers

Response workers are the foundation of any response. Without the human resources to commit, there is no response. Many response workers aid because they understand the needs of the victims and their ethical duty to provide assistance. Response workers have an ethical duty to care for victims and patients; however, this duty must also apply to personal care: a response worker who fails in the duty of self-care can risk becoming a vector for disease or another victim waiting for rescue (Lateef, 2011, p. 290). In that regard, it is essential to understand the psychological burden of response. It is common for response workers to feel powerless or overwhelmed; approaching the disaster may evoke feelings of horror or fear, which may have psychological repercussions (De Soir et al., 2012, pp. 118-119). The long-term impact of a disaster can result in posttraumatic stress disorders or lead to other psychosocial issues making interaction and reintegration into society more difficult (De Soir et al., 2012, p. 121; Guenther, 2012, p. 299). In understanding the degree of risk, it is important to understand certain factors increasing risk. Proximity to death in a disaster can increase the risk of psychological repercussions (De Soir et al., 2012, p. 120). It is also important to overcome certain misnomers about PTSD. While it is common to examine PTSD as the response to a singular event, it may also be caused over an extended period by multiple

smaller events (Rabjohn, 2013, p. 269); also, there is the possibility that a multiplicity of simultaneous factors may also contribute to the development of PTSD, which was the case in Japan following the earthquake, tsunami, and nuclear accident (Shultz et al., 2011, p. 142). A unique threat to the mental health of response workers following the Fukushima nuclear disaster was the threat of radiation (Matsuoka et al., 2012, p. 3); while the actual levels of radiation absorbed by members of teams sent to assess radiation exposure were undetectable (Monzen et al., 2011, pp. 2-3), that does not mitigate the concern over exposure. Furthermore, while those within the disaster zone receive the most attention in the literature, response workers in peripheral roles, such as government employees, can also suffer from health and psychological issues despite the lack of direct proximity to the disaster zone (Kitamura, Shindo, Tachibana, Honma, & Someya, 2013, pp. 1-2). Response work is likely to take a psychological toll; however, there is, or should be, treatment available.

In order for response workers to survive without long-term psychological trauma, it is essential to intervene before the disaster. The building up of individual resilience and adaptability helps prepare response workers for the intense situations encountered following a disaster (Guenther, 2012, p. 304). This can be aided by certain personality traits. Emotional stability is an important factor in preventing fatigue and psychological distress among response workers (Kitamura et al., 2013, p. 3). Once response workers engage in a disaster response, it is important to provide continual support. Following activity in a disaster response it is important to debrief response workers in order to promote healthy coping strategies (Guenther, 2012, pp. 306-307). Once the response

efforts are complete it is important to continue support. The experiences following the 2008 earthquake in China demonstrated a continued need for the support of response worker health even as the efforts moved from response to recovery (Wang, Chan, Shi, & Wang, 2013, p. 213). While not all experiences for response workers are negative, some responders also have positive experiences related to the experience (De Soir et al., 2012, p. 120), it is essential to provide essential support.

The response to the Fukushima nuclear disaster posed special issues. Japan has fewer doctors per capita than the OECD average; this limits the number available for disaster response efforts (Okuyama et al., 2012, pp. 244-246). While more training of nurses as response workers may be beneficial (e.g., Boone & Moore, 2011, p. s126), the Fukushima nuclear disaster also saw support coming from Universities. Fellows at Keio University School of Medicine were among the people who volunteered to join the DMATs (Fujishima & Suematsu, 2012, pp. 1-2). This led to a special role for universities in the Fukushima nuclear disaster.

University Involvement in Response

Universities are part of society, and thus become involved in all aspects of society. It is, therefore, not surprising that universities should aid in disaster response. Following hurricane Katrina several universities and colleges aided in the response efforts (Kapucu & Khosa, 2013, p. 4). However, the level of university response following the Fukushima nuclear disaster appears to have been better documented and possibly more significant than in previous disasters. Keio University School of Medicine and Nippon Medical School were represented among the members of DMATs (Fujishima

& Suematsu, 2012, pp. 1-2; Fuse, Igarashi et al., 2011, p. 402; Fuse, Shuto et al., 2011, p. 398; Koyama et al., 2011, p. 394). In addition, Nippon Medical School was active in supporting medical staff in Iwaki as well as aiding in the evacuation of intensive care patients (Koyama et al., 2011, pp. 394-395). The mental health of victims and response workers was also addressed by both Keio University and Fukushima Medical University (Kato et al., 2012, p. 17). Hirosaki University checked radiation exposure for individuals in Fukushima prefecture (Monzen et al., 2011, p. 2). Even universities geographically distant from Fukushima prefecture aided. Osaka City University aided in the formation of radiation mapping, which was necessary to provide information regarding possible radiation exposure to medical workers, in addition, the University of Nagasaki provided expertise in radiation exposure (Ishii, 2011, p. 147). This broad range of university support demonstrates the capability of universities in aiding a response. Unfortunately, there was no information in the literature about student involvement in the response efforts.

Curriculum

Disaster medicine is becoming more important to the health field and requires not only regular study, but also a place in continuing education curriculums (Huang et al., 2011). In America, there is insufficient expertise among physicians to handle disasters (Jasper et al., 2013, p. 2). Thus, there is a need for an increase in the amount of DM training. This need has not gone unnoticed, DM has been recommended for incorporation into curricula from myriad sources (Cummings & Corte, 2004, pp. 135-136). While there is not enough peer-reviewed research published regarding DM curricula, there appears to

be a trend towards the development of more DM curricula and related research (Cummings, Corte, & Cummings, 2006, pp. 132-133). The reasoning behind this is that education is essential to preparedness. A well-designed curriculum can be more effective than lived experiences in preparing individuals to handle disaster (Boone & Moore, 2011, p. s126). As such, it is important to understand what a DM curriculum would look like.

For a complete curriculum, there need to be courses outlining concepts to build a foundation, preferably at the undergraduate level, for later research-focused classes, preferably at the postgraduate level (Cummings & Corte, 2004). For the curriculum to be effective it must focus on outcomes; having measurable objective not only optimizes the ability of the instructor to assess, it also provides a focus for the studies on which the students can self-assess progress (Cummings & Corte, 2004, p. 137). This outlines the broad strokes of how the program would need to be organized; however, there are specific areas that need to be addressed. DM curricula can be broken into five primary categories: clinical, prehospital, hospital, administration, and research (Koenig, Bey, & Schultz, 2009, pp. 214-215). Clinical skills are those dealing with patients, prehospital skills deal with triage and preadmission patient management, hospital skills handle hospital resource management, administration includes both inter- and intra-agency management of systems and research involves understanding the specific characteristics of DM research (Koenig et al., 2009, p. 214). These five categories may not be covered by all DM students as DM is cross-disciplinary, however, the broader curriculum needs to integrate these five components. Another approach is the incorporation of three key components: disaster planning, disaster management, and community capacity building;

these key components can be used to cover a broad range of disaster scenarios (Kako, Mitani, & Arbon, 2012, p. 178). The difference between these two approaches would be the difference between an MD and a DPA/DBA specializing in DM. A PhD course would likely give greater focus on disaster research. For a DM curriculum to be effective, it needs to be comprehensive, cross-disciplinary, and adaptable, beginning with an assessment of current student competencies (Deshpande, 2011, p. 98; Pfenninger et al., 2010, p. 17). The one key component that needs to be incorporated across all possible disciplines is ethics. In order to prevent ethical dilemmas in disaster response, it is essential to train response workers in ethics (Lateef, 2011, p. 291). Ethics is the foundation of human behavior, and thus need to be incorporated into all curricula, especially DM curricula.

Results of the Literature Review

In undertaking and presenting this literature review, I started with a foundation and then built towards the future goal. The theoretical foundation incorporated theories of learning and social change, as well as the essential aspects of epistemology and ethics. Without understanding the theories on which concepts are built, it is more difficult to move forward in a rational manner. Empowerment was an educational theory designed to build the foundation for a democracy (Freire, 1973). This theory is now incorporated into many fields and has become essential to understand modern movements in health, education, and media literacy (Bergsma, 2004). However, the theory of empowerment is a theory of what should be learned, not how. In order to address the issue of how, it was essential to look at a different educational theory. The theory of cognitive content

engagement presents an understanding of how students learn (McLaughlin et al., 2005). This theory was designed for a classroom, but it works as a theory of real-world learning as well. The next stage was an approach to knowledge. Rather than taking a strong epistemological position such as positivism or social constructivism, the approach of general systems theory provides a more subtle approach for examining the phenomenon. One aspect of the systems approach is the understanding that social constructivism works well when examining social constructs, such as systems (Ison, 2008). This, along with concepts of contextuality and complexity, lend this study towards this approach. Finally, ethics is often seen as complex and difficult. It is, however, possible to take all the principles and scenarios and summarize ethical behavior in a single thought. What is ethical is what promotes the best results for the most people with the least harm (Mill, 1863). Ethics is the foundation of human interaction, and doing the greatest good is the foundation of modern ethics.

The next stage in building an understanding was a broad understanding of DM, a complex and multifaceted multidisciplinary field that is both ancient and nascent. The foundation of DM is an understanding of the disaster cycle. While there is disagreement over the terminology and exact breakdown of the disaster cycle, there is a general agreement on the need to understand DM as cyclical. Furthermore, the cyclical understanding allows for a greater perception of the interconnectedness of each phase (Depshande, 2011). This also allows us to understand the needs to address specific issues across all stages. Communication, community resilience, consideration of at-risk

populations, and global climate change all present specific issues at each stage of the cycle. These issues need to be addressed in each stage on a continual basis.

Next, I moved to the specific phenomenon related to my research, the Fukushima nuclear disaster. The Fukushima nuclear disaster was a complex disaster, which was just one part of another complex disaster. There were successful aspects of the response, as well as mistakes. The Fukushima nuclear disaster cannot be seen in terms of black and white. The specific aspects of the disaster I examined, response workers and university involvement, affirmed the need for this specific study, while also demonstrating the holes in the literature. The specific actions of students were not covered by the papers which focused on university participation. Furthermore, I could find no research concerning students as vulnerable or at-risk in regards to either disasters or involvement in disaster response. These holes in the literature demonstrate an area of study that has not been covered up until this point.

Literature Related to Methodology

Because disasters are complex, a deep contextualized analysis can aid in understanding the impact of disasters on individuals (Grynszpan, Murray, & Llosa, 2011, p. 203). In addition, the relative rarity of disasters requires techniques designed to get as much information from each case as possible (Grynszpan et al., 2011, p. 203). It is also essential to respect the special vulnerability of research participants as victims (Lateef, 2011, p. 291). Because of these aspects of disasters, the need for qualitative research to produce contextualized accounts from small samples is essential. In qualitative research, the constructive framework is the norm (Creswell, 2007; Patton, 2002). As reality is

defined by perception, in many ways, individual and cultural context are important aspects of the constructivist framework (Creswell, 2007). The constructivist framework also works well in understanding individual perception in the context of a system or an event.

In examining experience in a complex situation like a disaster, it is sometimes useful to simplify. Phenomenology addresses the examination of perception, contextualized through a perceived event to get at a larger truth (Moustakas, 1994, p. 26). Rather than examining the narrative, the phenomenon allows for a focus on experience. Phenomenology brings to light aspects of the human condition through the context of a specific phenomenon then encapsulates them into transferable aspects that increase the broader understanding of human experience (Bloor & Wood, 2006, pp. 129-130). This also required a special effort on the part of the researcher. The central goal of phenomenological research is to dismiss personal experience and use objective analysis to derive a generalizable concept of the experienced phenomenon (Miller & Salkind, 2002, p. 152). In regards to this final issue, transcendental phenomenology was an exceptional model.

In understanding transcendental phenomenology, it is important to differentiate between Husserl and Moustakas, Husserl's approach attempts to be objective whereas Moustakas' approach is subjective to the participant (Giorgi & Giorgi, 2008, p. 171). Understanding transcendental phenomenology begins with the reality that objective reality can only exist through subjective perception (Moustakas, 1994, p. 27). In order to come to objectively perceive the subjective account of the participant requires a special

effort on the part of the researcher. To undertake transcendental phenomenology, one must begin at a state of epoche, transcendental ego, or naiveté; all preexisting knowledge is set aside and the phenomenon is looked at anew through the eyes of the research subjects (Moustakas, 1994, p. 33). The next step in transcendental phenomenology is reduction, the primacy of the specific phenomenon (Moustakas, 1994, p. 34). The final step in transcendental phenomenology is imaginative variation, the process of deriving the essence of the phenomenon (Moustakas, 1994, p. 35). In order to do this, from a more technical perspective, the researcher obtained a full account of the experienced phenomenon, established themes, analyzed the text in terms of meaning units, and derived a general structure based on the analysis (Giorgi & Giorgi, 2008, pp. 169-170). Again, for the researcher to effectively analyze the phenomenon, the researcher had to ignore previous personal experiences and consider the experience of the phenomenon rather than the phenomenon itself: the phenomenon had to be considered as a constructed event rather than a real event (Giorgi & Giorgi, 2008, p. 170). In order to answer my research questions, this approach was the best choice.

Summary

The literature review was as extensive and inclusive as possible. The literature review examined literature primarily from peer-reviewed journals within the past five years. However, in areas where the literature was sparse, or in addressing specific past disasters, some literature was taken from before this period. Furthermore, some historical literature and books were incorporated into the review to provide context for a greater understanding of the literature. Through a thorough search of the literature, it became

clear that there was a gap in the literature. The experiences of student response workers were not addressed in the literature, nor were the needs of students for special consideration as an at-risk group. These gaps created issues with providing students with informed consent for participation and for expanding disaster infrastructure to incorporate universities. This literature review provides the foundation for Chapter 3, which will address the methodology used in the study.

Chapter 3: Research Method

Introduction

There were many failures leading up to and following the Fukushima nuclear disaster (Funabashi & Kitazawa, 2012). Understanding these failures will be essential to understanding the future of nuclear energy and nuclear disaster response (Funabashi & Kitazawa, 2012, p. 11). However, it is important to understand successes as well as failures. The involvement of universities in the disaster response (Fujishima & Suematsu, 2012; Fuse, Igarashi et al., 2011; Fuse, Shuto et al., 2011; Ishii, 2011, p. 147; Kato et al., 2012, p. 17; Koyama et al., 2011; Monzen et al., 2011, p. 2) demonstrated the powerful instrument universities could be as an aspect of disaster infrastructure.

Transcendental phenomenology provides a manner in which to understand experience through the participants' eyes (Moustakas, 1994). This was used to understand the experience of graduate students and the perceived impact of involvement on their academic performance and their personal well-being.

In this chapter, I will examine the design of this study, the role of the researcher, the methodology, and issues of trustworthiness. These issues are important in understanding the type of data that was collected, and the manner in which those data were analyzed, as well as social implications of the study.

Research Design

The focus of this research was to answer two research questions. How do graduate students perceive the impact of involvement in the Fukushima nuclear disaster response on their academic performance? How does identity development occur in the context of

experience in the Fukushima nuclear disaster response? This research was focused on understanding graduate student experience in the context of involvement in disaster response. The response is the immediate action following a disaster to provide support and aid to victims and to limit the scope of the disaster (Kapucu, Arslan, & Collins, 2010, pp. 227-228). The impact on the subjects can be either positive or negative experiences (De Soir et al., 2012). These experiences defined the manner in which the subjects' lives were impacted.

As the purpose of this research was understanding the impact of a phenomenon, phenomenology was the ideal method. Transcendental phenomenology examines the phenomenon as something perceived, with the motivation of understanding the observer in the context of the observed (Giorgi & Giorgi, 2008, p. 171). In order to take a more objective role as a researcher, I chose transcendental methodology. The purpose of transcendental phenomenology is to let the data speak for itself (Moustakas, 1994). As empowerment was used in the theoretical foundation, a methodology that empowers the voices of the subjects was appropriate.

Role of the Researcher

My role in the context of the event was one of an observer. I did not participate in the response efforts; I only observed the subjects in the aftermath through interviews. The specific role of the researcher in this study was somewhat complex. While I was a graduate student, as were my subjects at the time of the Fukushima nuclear disaster, I was also a university lecturer. While the subjects were not my students, the chance for the role

to become an impediment is important to acknowledge. In acknowledging the roles, the role of fellow student was emphasized in order to increase rapport with participants.

In order to prevent the possibility of the exploitation of supervisory roles, my contact with the participants was kept confidential from advisors, professors, or mentors of the participants. Participation was voluntary and participants had the choice to end it at any time. The use of data was cleared with participants before use.

Methodology

Participants

The participants for this study were individuals who engaged in response activities following the Fukushima nuclear disaster as graduate students. While a larger sample size may have improved generalizability, the smaller sample size enabled the researcher to seek greater depth and contextualization (Maxwell, 2013, p. 97). For small sample sizes, it is essential that each participant contribute an account dense in information (Patton, 2002, pp. 242-243). The final sample size was six subjects, four male and two female. Only one of the subjects was non-Japanese. This sample size lies within Polkinghorne's guidelines for phenomenological research as being between five and 25 (as cited in Creswell, 2007, p. 61). In order to make use of this sample, it was necessary to seek significant depth and context from each participant. This allowed for a selection of students from multiple universities that were involved in different activities. By drawing as broad a sample as possible from this small population, it was possible to achieve saturation as the data were collected in an effective and meaningful manner. Furthermore, the breadth of experiences made it easier to identify broader themes.

Preceding the interview stage, university staff who were engaged in response activities were contacted. Those contacted were informed of my interest, and information related to former graduate students under their purview was solicited. I informed those to be interviewed that the data from the brief interviews (Appendix A) would be used for triangulatory data and obtained permission for its inclusion. I also informed these individuals that who I contact was confidential and that student names will not be shared whether they chose to participate or not.

Each participant was given a unique alphanumeric code known only to the researcher. All names and identifying information was made generic for the transcripts and notes.

Data Sources

In order to triangulate data, several sources of data were sought. The primary source of data was through open-ended interviews with participants (Appendix B). Secondary interviews with supervisors of graduate students (Appendix A) were used to provide background information. Furthermore, letters, emails, and social network messages from the period of response activity participation were sought to provide further information related to the mindset of participants at the time of the phenomenon; however, none was made available to me.

For the instrument, I developed a tool to specifically measure the information needed for this study. The procedure was similar to the one employed by De Soir et al. (2012). The interviews began by obtaining informed consent. The purpose of the interview, the use of the data, the possibility of publications related to the data, the right

to refuse to answer questions, and the right to end the interview were obtained in a checklist fashion. This was followed by four question sets. The first question set was related to identity information at the time of the phenomenon. The second question set was related to the experience of the phenomenon. The third question set was in regards to the academic impact. The final question set was in regards to the social impact. The questions were similar to questions used in other research (e.g., De Soir et al., 2012; Wang et al., 2013). The question sets were one initial question with guidelines for follow up questions or prompts if further information was necessary. After the interviews conclusion, permission for the use of data was once more obtained, and access to other possible data sources including letters, emails, and social network messages from the period of response activity participation was also solicited.

In order to ensure content validity, I first went through the instrument and answered the questions myself to assess how I would answer the questions. I then discussed the questions with colleagues to assess possible problems. Finally, I used a small pilot study to assess the validity. These procedures are in line with the recommendations of Maxwell (2013, p. 101). The pilot test used the same question sets and procedures as were used for the final experiment, adjusted slightly to examine experience with culture shock during foreign exchange studies. While the topic for the pilot test was different, it was a good proxy for a stressful experience that can be conveniently sampled. The other difference was that the test instrument was used with undergraduate and graduate students. All other procedures with the participants were

identical. The question sets were judged to be effective and possible issues were identified and corrected through this pilot study.

The data collected from the interviews with participants, in addition to data from advisors, provided sufficient information to formulate the background of the participants and the impact of the event on the participants, which provided sufficient information to answer the research questions.

Procedures

The first stage of the data collection was to contact authors affiliated with universities that aided in the response. The initial contact email was written in both English and Japanese and was used to seek an interview. The interviews were conducted through email and mail. Upon receiving consent, the questions were sent to the researchers and responses were recorded. While video telephony interviews were sought, all researchers declined. The purpose of this background information was to contextualize and triangulate the experience of the students. I was not able to directly observe the participants at the time of their involvement; however, the observational data of the advisors provided some insight into the participants' experience at the time.

The next stage of the data collection was the use of email messages, social media, posters, and word of mouth to obtain consent for interviews with graduate students who were involved in the response efforts. Those students who responded affirmatively received further information related to informed consent before being contacted for the interviews. Two subjects chose to have interviews in public spaces; those were not conducive for video or audio recording, so notes were taken. Two more participants

chose to only interact through social media and were interviewed through Survey Monkey. Two more participants did not use skype, however chose to use Facebook messenger video telephony. The same consent procedures that were used with academic advisors were used with the students. The students were then read the checklist to affirm informed consent before going through the entire instrument. Following the interviews, permission to use any digital documents from the time of the response efforts or digital copies of physical documents was sought. The participants were then given an amount of time of their choosing to discuss any aspects of the interview or research off of the record. This period allowed for an informal debriefing and promoted closure.

The first stage took 4 months; the second stage took 6 months. There was a great deal of difficulty in finding participants because many were no longer university graduate students, and many who were contacted did not respond. Because of the necessity of data maintenance, data will be kept available for 5 years beyond publication (American Psychological Association, 2010, p. 12); the data are stored on storage devices that are kept disconnected from the Internet and kept in a secure location. The data files are stored in folders allocated to each subject using alphanumeric codes to ensure anonymity and security.

Data Analysis

Once the interviews were transcribed and translated, a system of coding was used to identify meaningful themes. This began with reading the data first (Maxwell, 2013, p. 107). Then a conceptual framework was used to identify the initial coding. The use of a conceptual framework was helpful in determining the coding to be used (Miles &

Huberman, 1994). The initial themes to examine were: positive, negative, academic, and identity. Over time, the themes became more clear. The data were transcribed into Microsoft Excel and themes were coded using separate sheets. The selected themes directly address the research questions, data that seemed to conflict with the general trend were reexamined and noted in the analysis.

Issues of Trustworthiness

In order to ensure validity and reliability, it was essential to design a strong research framework designed to specifically address the issues targeted, employing multiple theories to triangulate perspective and to be specific enough in designing procedures as to ensure that repetition can occur (Grynszpan et al., 2011, p, 204). The primary source of internal validity was the use of triangulation. Triangulation decreases the threat of bias (Maxwell, 2013). In this study, the perception of advisors was used to triangulate with the interview data. The data were derived in thick description that was sufficiently contextualized to provide for transferability. Multiple examinations of the data and appropriate use of triangulation also support the dependability of the data.

In order to confirm the accuracy of the data, the transcript of or notes from the interviews were sent to participants. The transcripts or notes were sent in both English and Japanese, and the opportunity to make alterations or explanations was given to participants.

Finally, the utilization of a systematic approach to examining the coding and to confirming the coding multiple times was used to establish coding reliability.

Ethical Procedures

There was no risk of physical harm to participants. While the possibility of psychological harm through the reliving of possibly traumatic experiences existed, the ability of participants to choose their surroundings for the interviews and to leave the interview at any time eschewed these concerns. Participation was voluntary and no institutions were directly involved in the interview process. Data are and will be stored on offline devices in password protected files in hidden folders. The actual storage devices are in a locked file case. The key and password are known only to me.

Summary

In Chapter 3, I outlined the methodology for data collection to be analyzed through the research. The use of triangulation of data from interviews and documentation created by the participants, in addition to interviews with the faculty in supervisory roles over the participants, created a robust data set to answer the research questions. The answers to those questions will be examined through the analysis of the research. Chapter 4 will address the results of the interviews while Chapter 5 will address the implications, potential for social change, recommendations for future research, and conclusions.

Chapter 4: Results

Introduction

The purpose of this phenomenological study was to improve understanding of how graduate level university students perceive the impact of involvement in DM during the response phase following the Fukushima nuclear disaster in terms of personal and academic growth, as aspects of identity. Furthermore, it is important to understand how that experience shaped future experiences and the identity of those individuals following their involvement. This chapter is structured around the research questions of the perceived impact of involvement on academic performance and identity development. The focus of the relationship between the phenomenon and the changes that subjects credit to the phenomenon is central to the interpretation of the data. The data from interviews with individuals who managed teams that included graduate students provides background context for understanding the data collected from the subjects, who were graduate students at the time of their involvement. In this chapter, I summarize the findings of a qualitative transcendental phenomenological study based on interviews with individuals involved in the Fukushima nuclear disaster response while they were graduate students.

Data Collection

Interviews were conducted over an extended period of time in a variety of formats. The formats and venues were chosen by the participants. All participants received a written explanation of the informed consent letter, interviews in person, and through video telephony; they also also received an oral explanation of the informed consent

letter (Appendix C) and were provided with a copy of the informed consent letter for their own files. The consent contained contact details if further information was required and included the Walden University approval number. All the participants had experience with research and confirmed that they understood the concept of informed consent.

Background Interviews

The background interviews were conducted between May 28th, 2014 and September 12th, 2014. Researchers who had written papers regarding the Fukushima nuclear disaster response were contacted by email. Four researchers established contact, while one was ruled out because that researcher had not been involved in activities involving graduate students. Table 1 shows the demographics of interviewees. While the use of video telephony was suggested, two participants preferred to respond through email and one preferred to respond through mail. The interviews were semistructured and designed to develop an understanding of how they had been involved, and how they had perceived the impact of the event on graduate students. Two respondents chose to reply through email while one respondent chose to reply through a letter. One of the respondents requested the questions in Japanese only and responded in Japanese. One of the respondents requested the questions in English and Japanese and responded in English. One of the respondents requested the questions in English and responded in English. All the respondents' responses were transcribed to an Excel file for referencing and cross-referencing. The Excel file and digital copies of the email correspondence are password-protected and backed up on two password-protected external devices stored in a secure location.

The interviews were reviewed and used to provide perspective on the perceived experiences of the graduate students who were the subject of this study. A pilot study using a proxy stressor had been conducted prior to the interviews. Following the pilot study, the two questions from Section 2 were asked on separate lines to promote more thorough answers to both questions in the written format. Section 1 of the interviews provided a foundation for what was happening prior to the disaster, using the prompt, "What were you doing in the week before the Fukushima nuclear disaster?" in order to understand where they were before their experience. Section 2 provided an understanding of their actual experiences through two questions: "How did you decide to participate in the Fukushima nuclear disaster response?" and "What activities were you involved in during the Fukushima nuclear disaster response?" to provide an understanding of what they were doing during the response. Section 3 allowed the subjects to explore how the graduate students in their purview had changed from an academic perspective, using the question, "Did you see any change in the academic work of students that participated after they returned to school?" Section 4 addressed how students had developed on a more personal level, using the question, "Were there any episodes which implied that the students who participated had changed as a person?"

Subject Interviews

The subject interviews were conducted between February 1st, 2015 and July 28th, 2015. For the student interviewees, I attempted to contact individuals who were students at the time of the nuclear disaster response by having posters placed near schools where I had confirmed that some students had been involved. I also posted requests for research

subject on Facebook and Twitter. This method yielded no results. I attempted to contact some students through Facebook by looking for anyone who had been at one of the schools whose involvement I could confirm in a graduate program at the time of the Fukushima nuclear response. I used similar methodology on LinkedIn. This also yielded no results. By discussing my research with friends and family, I was able to find five interview subjects who had been involved in Fukushima nuclear disaster response when they were graduate students. The final participant was a chance encounter at a hotel in Tokyo; when I was on my way to an in-person interview with one of the other interviewees, I was discussing the purpose of my visit with the concierge and they introduced me to this interviewee. Table 1 shows the demographics of interviewees. Two of the student interviewees chose to have their interviews in person, two chose to use Facebook video telephony, and two chose to use email. All the respondents' responses were transcribed to an Excel file for referencing and cross-referencing. The Excel file and digital copies of the email correspondence are password-protected and backed up on two password-protected external devices stored in a secure location.

The interviews were reviewed, and similarities and differences were examined taking into consideration the subjects' roles in the disaster response and their proximity to the response when they made their choice to respond. The format of the interviews was decided by the interview subjects. Two interview subjects chose to have interviews in public venues and could not be recorded, so notes were used to record them; both of those interviews were in English. Two chose to respond through email, both requested the questions in Japanese, but one answered in Japanese while the other answered in

English. In addition, two more chose to use video telephony through Facebook; however, a method to record those interviews could not be found, so notes were used for those interviews as well. Those interviews were done in Japanese, but the notes were taken in English.

Section 1 of the interviews provided a foundation for what was happening prior to the disaster, using the prompt, "What were you doing in the week before the Fukushima nuclear disaster?" in order to understand where they were before their experience. Section 2 provided an understanding of their actual experiences through two questions: "How did you decide to participate in the Fukushima nuclear disaster response?" and "What activities were you involved in during the Fukushima nuclear disaster response?" to provide an understanding of what they were doing during the response. Section 3 allowed the subjects to explore how the graduate students in their purview had changed from an academic perspective, using the question, "How did you approach your graduate school activities when you returned?" Section 4 addressed how students had developed on a more personal level, using the question, "How did your friends or family respond to you after you returned?" Follow-up strategies were used to focus the respondents' answers (Appendix B).

Table 1

Demographics of Interviewees

Role	Number interviewed	Male	Female	Japanese	Non-Japanese
Faculty	3	3	0	2	1
Student	6	4	2	5	1

Evidence of Trustworthiness

The data from the interviews were collected with thick description in order to contextualize the participants' experiences of the phenomenon. The notes or transcriptions were examined by interviewees for the purpose of reliability. The data were then examined and coded systematically to support coding reliability. The coded data were then triangulated through observations of graduate students made by faculty members who had overseen graduate students during the Fukushima nuclear disaster response. The use of multiple and systematic examinations of the data and triangulation support the dependability of the data.

Results

The coding of the data used the transcendental phenomenological method. This method can be broken into three interdependent parts: epoche, transcendental-phenomenological reduction, and imaginative variation (Moustakas, 1994, p. 33). The purpose of epoche is the removal of personal judgement and interpretation. In order to prevent personal judgement from informing my questions or interpretations, I wrote an account of how I expected participants to respond. I then wrote two accounts of possible responses that appeared highly unlikely to me. I went through the questions to determine if all the answers would be reasonable for the questions. During the interviews, I focused my attention on details that did not match my preconceived notions. The format of the questions lent themselves to the textured description necessary for transcendental-phenomenological reduction. The goal was to understand the perceived experience of the phenomenon as a discrete whole. The imaginative variation involves the derivation of

fundamental meaning from the discrete experience. This involved the derivation of broad themes that were derived from the lived experiences of the interviewees, but were more broadly applicable.

This study focused on two research questions:

RQ1 – Qualitative: How do graduate students perceive the impact of involvement in the Fukushima nuclear disaster response on their academic performance?

RQ2 – Qualitative: How does identity development occur in the context of experience in the Fukushima nuclear disaster response?

Understanding the responses in the context of these research questions yielded three important overarching themes. The first theme that emerged was proximity; this had a dual nature in that the proximal relationship had an impact on the decision-making process, but also there was a subtheme of foreignness involved in perceptions of the postdisaster landscape. The second theme to emerge was priorities. Academically, the perceived purpose or utility of certain aspects of education shifted. The third theme was relationships. For identity development, the relationship of the individual with others is a fundamental aspect of identity. There were several ways in which relationships played out in the context of the responses: breakdowns, changes, new relationships, and religion.

Background

The school year in Japan begins in April and, for graduate studies, ends near the beginning of March. Other than two of the faculty, who had hospital duties in addition to their university duties, this was the theme of the response to the first section of questions. One participant noted that “the school year had just ended, my bedside learning activities

and tests were finished, I was relieved." The time prior to the disaster was forgettable. Participants noted that there "得に何も覚えない [was nothing particularly memorable]" or that they were "得に何もしていなかった [not doing anything in particular]" prior to the disaster. Another common sentiment was that they remembered "looking forward to a normal spring break."

The theme of normality existed in all the accounts. None of the participants felt like they had any foresight of the upcoming event, nor did any remember anything notable in the week prior to the event.

Activities

The faculty members who were interviewed were involved in medical and managerial activities during the Fukushima nuclear disaster response. One of the faculty members led teams transporting critical care patients to hospitals in Tokyo. Another was focused on the both first aid and occupational health of aid workers. The third faculty member interviewed was involved in the transport of medical supplies into the disaster area.

The students came from a broader range of experiences. While two of the participants worked with DMATs as logistics officers for first response and medical records activities, two other participants were involved in farmland reclamation and refugee relocation, one was involved in translation services, and another was involved in fund-raising activities for a student-organized relief campaign. This provided a breadth of experiences to examine.

The students who were involved in the DMATs had very different missions for their involvement. One student was a member of one of the earliest groups to visit the response area. This student's primary responsibility was to drive; the car used by the DMATs did not require a special license and was actually a familiar model for the participant. The participant was also responsible for the moving of medical equipment into and out of the vehicle. The other participant who was involved with a DMAT had more responsibility as a member of a later group. That participant helped with the standardization of medical records in the response area and preparing those records for future teams.

One participant who was involved in farmland reclamation and refugee relocation lived in the initial evacuation zone, and so was a refugee as well. That participant could do little to help with the reclamation of farm lands, although some equipment and seeds were salvageable. Another participant was involved in a slightly later period of the response and came from the Kansai region, which includes Osaka, Kyoto, and Kobe, of Japan, which is far removed from the area of the disaster. This participant was able to help with small farming projects, helping with removal of the top layer of soil, which had a higher than acceptable level of radiation, and the reclamation and radiation monitoring of the land underneath. The participant was also involved in some relocation from older refugee camps to semipermanent refugee camps.

Another participant was working in the hospitality services as an intern prior to the disaster. Following the disaster there were few tourists, so the participant spent time

translating radiation information brochures for foreign residents and working as a translator for non-Japanese speaking patients who required care.

The last participant helped organize and participate in a student-formed fund-raising group. This group was involved in organizing and participating in fund-raising campaigns in and around the Kanto region, which includes Tokyo and Yokohama, of Japan. This participant spent time with a group of students asking for money in parks and train stations to help support response and reconstruction efforts.

A common theme when describing their activities was minimization of their role and the suggestion that could have done more. One participant stated that "there was a great deal more which needed to be done." The participants often used words like "only" and "だけ [only]" to describe their activities. This minimization balanced the contrast between the participants' capabilities for the tasks they were involved in and the sense of being overwhelmed by the scope of the disaster.

Proximity

An important factor in understanding the impact of the experiences is the proximity to the disaster. Being close to the dead and dying can have severe psychological repercussions (De Soir et al., 2012, p. 120). However, even at a distance, psychological impact can be felt (Kitamura, et al., 2013, pp. 1-2). The Fukushima nuclear disaster, and the associated earthquake and tsunami, created a situation where one participant noted that acute and psychological care were far more prominent than acute care. None of the participants addressed situations of high stress or close proximity to the dead or dying. There were, however, other forms of proximity that were far more

significant for this disaster and for these participants. The first theme to consider was the participants' proximity to the disaster zone. The second theme to consider was the theme of proximity to the identity of those they were helping. The final theme to address was the theme of foreignness.

All but one of the participants lived in or near the evacuation zone. One participant lived within the smaller initial Japanese evacuation zone while one participant lived outside the Japanese evacuation zone, but within an area that had been declared an evacuation zone by several other countries. The participants from within the evacuation zone saw the greatest resulting stress. The participant who was in the initial Japanese evacuation zone was forced to move and ended up getting divorced. The participant, who was outside the Japanese evacuation zone, but within certain international zones, chose to change careers from hospitality services to health care services. Both of these respondents made comments suggesting uncertainty of the future, a feature not found in respondents that were further away from the disaster. However, the respondent that was within the international evacuation zone stated, "Fukushima will recover."

The proximity to the disaster also changed the decision-making process. Faculty and students near the disaster zone commented on how the need was "目の前 [right in front of my eyes]," while the overall notion that the decision was "easy" was seen throughout the other participants from near the disaster site. The participant from Kansai, however, made a more deliberated decision based on the experiences of a friend who had volunteered prior to the participant. The participant expressed that the interest to help was always present, but that the best way to help was unclear.

Proximity can also be perceived from a different perspective, the proximity of identity. While the two participants that were in the evacuation area were directly helping friends and neighbors, another form of identity-related proximity also emerged. One participant who was working with one of the DMATs discussed the issue of medical care for health care staff. The participant expressed it as a realization, the health care staff in the evacuation zone were not only first responders, they were also victims. Cases of helping others with a proximity of identity, through community or vocation, were discussed at greater length than other cases.

On the opposite end of the spectrum of proximity was the perception of foreignness. The participant from Kansai noted that the first impression upon arrival at the emergency housing facility on the edge of the disaster zone was, “this is not my country.” The participant further explained that notion in the sheer scale of devastation that was still visible even from a place somewhat removed from the disaster zone. The housing was also not what the participant expected. The lack of privacy at the temporary facility, and the limitations of waste services were below the standards that the participant expected. The participant confirmed that the combination of the devastation and the level of the relocation facilities led to the overall sense initially expressed that, “this is not my country.”

Another participant expressed a similar notion. The participant was a member of a DMAT and was assigned to drive down a familiar route. The participant discussed how the damage to the road and surrounding area by the combination of disasters made the entire trip surreal. The participant suggested that seeing the landscape on television did

not in any way prepare the participant for seeing it personally. The "凸凹[uneven]" road made the familiar road unfamiliar. The description of the shift in the roads and the landscape following the description of the car and the route as being familiar may also be significant. The participant may have formed a contrast between what was familiar and what was not familiar, but should be.

While only two participants expressed the concept of the landscape being foreign, the concept that a phenomenon can be both proximal and foreign to the same participant is noteworthy. The participant that discussed the uneven road was the same participant that expressed a connection with the health care workers receiving medical care. The participant from Kansai also expressed that they formed a connection with many of the refugees and volunteer staff. In this context, foreignness is not held as being oppositional to proximity, but a separate yet connected theme. Foreignness relates to how something proximal, which should be familiar, can be jarringly unfamiliar.

Priorities

The first research question was about academic performance. The impact of the phenomenon on their academic lives was an important question to ask and provided a series of themes that promoted an understanding as to the academic impact of involvement in disaster response.

The faculty that were interviewed all expressed similar sentiments regarding how students changed in terms of academic studies. The first theme that emerged from the faculty was an increased focus on graduation. The students became "more focused on completing" their academic activities. Students also had "a more solid grasp" of what

they were working towards. The other theme that emerged was an increase in critical thought. In particular, the role and function of government and the need – or lack thereof – for nuclear energy were questioned more by students that took part in response activities. “原子力に対する考え方がこれを廃止しようという考え方に変化しました。[(Students) changed their attitudes on nuclear energy to one of opposition.]” The link between academia and life past graduation was considered to be more real for the students, was the general interpretation of the faculty that were interviewed.

While one student stated, “変わらない[there was no change],” the other participants seemed to reflect the observations of the faculty. Several themes emerged regarding the exact shift in priorities. The first theme was the shift in focus from academic studies to goals and priorities following graduation. The second theme to emerge was the theme of shifts in content of study. The final theme to emerge was the shift in perception of the importance of academia. These themes create an interesting context for how the participants changed as students.

A theme that emerged in each of the cases was the importance of life outside of academia. This took two forms, the first form was an increased determination to graduate and clarity of what the participant wished for in their careers. One participant saw the need for compassion when giving care to victims in the field and felt that it provided perspective on the type of doctor the participant wished to become. The second form this shift took was academics simply becoming a secondary priority. One participant suggested that helping Fukushima and Tohoku recover continued to be the primary goal, and at the time graduation could take a back seat to that goal.

A recurring sub-theme associated with the theme of academia being secondary to life beyond academia was the theme of altruism. This was reflected by the previously mentioned participant's focus on compassion as an aspect of the participant's postdoctoral career identity. Another participant felt that altruistic motivations were an important aspect to incorporate into the participant's identity. One participant argued for an improvement to information architecture designed to better allow students to enter into volunteer activities in the case of a disaster. The sub-theme of altruism was not only connected to the theme of postgraduate focus, but also, it was also an aspect of the second theme of shifts in the content of study.

While all the participants were in graduate school at the time of their participation in the response activities, two are continuing their education. Both of these participants shifted their academic goals following their participation. One of the participants was studying linguistics, but is now studying international relations with a focus on nonprofit organizations (NPOs). That participant began the shift in the immediate aftermath of the response efforts by incorporating courses related to historical issues into the participant's chosen coursework. Upon graduation, the participant decided to continue education, but shift fields. The participant indicated that the choice was connected to experiences in the Fukushima nuclear disaster response. Another participant was involved in an internship near the end of a degree in tourism studies. This participant indicated that there were two reasons for the change in focus: experience in the disaster response efforts and the change in the economic environment around Fukushima. This participant continues to work in the hospitality industry, but is seeking a graduate degree in health care services. The

participant indicated a goal of becoming a home-health-care provider. The shift in academic focus is a difficult choice to make, however, these two participants indicated that the experience in the Fukushima nuclear disaster response pushed their decision.

The final theme that emerged was this shift in the perception of the importance of academia. While this is, in some ways, similar to the first theme, it is separate and unique. The first theme examined the need to move beyond academia, whereas this theme involved the questioning of the value of academics writ large. One participant indicated that academics had become pointless; the value of study and research was no longer an issue when people needed homes and care. This goes beyond the shift of academics as secondary. While only one participant expressed this theme, it is important to note as it brings into question some assumptions of the researcher.

These themes provide a portrait of the participants as students moving into the real world and maturing quickly. The contrast between one participant that sought to graduate, but felt it lacked meaning, three participants that sought to graduate and enter life beyond academia as quickly as possible, and two participants that saw the importance of life beyond academia, but saw a need to expand their knowledge by shifting their studies within academia, provide a rich variety of perspectives. The participants did not have the same responses, but the overall theme of increased value in the world beyond academia stood out.

Relationships

The second research question was about identity development. Identity development is difficult to discuss, and this resulted in the themes relating to identity

being focused more on social relationships than on individual identity. This may be the result of cultural norms that frame the individual as a member of society. This interpretation could also be relevant to the foreign participant, who had been in Japan for a sufficient period to accept those cultural norms. However, the more important aspect of this thematic grouping is that identity is a social construct, and as such it is largely defined by the social groups you identify with.

The faculty that were interviewed provided some insight into how students reacted to the situation. The faculty demonstrated concern over the stress levels of students, with one faculty interviewee stating that a student "hit a wall" during the response activities and took some personal time to recover. The same respondent, however, stated that when the next term began those that were involved in the response efforts were "energized and motivated," and that those that worked together during the response activities tended to continue to work together following their return. Another interesting theme, identified by one of the faculty respondents, was that of "諸行無常 [impermanence of worldly material]" which is a term associated with Buddhism. The faculty respondent suggested that students who had been involved in the response efforts were more likely to consider what they actually needed rather than what they wanted. The same respondent also asserted that they were more flexible of mind.

The themes that emerged from the student interviewees can be broken into four categories. The first was the category of breakdowns. Some of the participants had problems with certain relationships following their involvement. Another theme was change. The participants changed the valuation of their current circles of friends. The

third theme was new friendships. Many of the participants discussed developing new friendships made possibly by participation. Finally, there were some cases where religion did emerge as a theme.

The participants that were closest to the disaster shared experiences of breakdowns in relationships. The clearest example of this was the participant in the original evacuation zone. This participant had to move, so lost contact with many friends, and also got divorced. The participant in the foreign evacuation zone lost many friends who returned to their country, under "evacuation recommendations," and did not return. Furthermore, this participant noted that the decrease in money for the local economy meant that there were fewer jobs available. This participant stated that limitations on finances in addition to radiation concerns have decreased social interaction. Another participant noted that it was hard to share actual experiences about the disaster and response. This candidate, however, also suggested that the experiences allowed for a bonding even if they went unspoken; the candidate stated that it created a "stronger sense of community."

This "stronger sense of community" fed into the next theme, change. While there were breakdowns in some relationships, the value of relationships and the valuation of particular relationships appear to have shifted. One of the faculty suggested that those that assisted in the response became more empathetic, this seems to be reflected in the accounts of the individual participants. One participant stated that "the ability to help others helped me become a better person." Another theme was the change in circles of friends. A faculty interviewee stated that students that worked together in the response

effort tended to work together in the classroom. This shift in circles of friends was also noted by one of the participants, “友人は友人けど、親友が変わった[my friends were still my friends, but who my close friends were changed].” The themes of empathy and shifting values of particular friendships, however, were less common than the theme of community and the value of personal relationships. One participant stated that the value of friends was reinforced. This is also reflected in the previously noted comment about a “stronger sense of community.” Another participant stated that religious and fundraising communities became important aspects of the participant’s life. One participant asserted the increased strength of community to shared experience. The participant noted that everyone had strong experiences related to the disaster and suggested that those experiences, even left unspoken, created a sense of shared meaning.

The idea, of shared experiences or shared meaning, ties into the next theme of new friendships. Three of the participants addressed this theme. Those that mentioned new friends broke the new friends into three groups. The first group was professionals in the field of disaster response. The second group was fellow students and fellow volunteers. The third group was refugees or patients. The order of these groups was also the same.

The final emergent theme was religion. The researcher did not expect religion to emerge as a theme because religion does not play a large role in Japanese culture or society. The first emergence of religion was in the first interview with a faculty member, who brought up the Buddhist concept of “諸行無常 [impermanence of worldly material].” While this is a word specific to impermanence as a religious concept,

nonreligious groups, such as the Greek Stoics, also addressed the concept of impermanence. The second appearance of religion came from a participant that chose to join the response through a religiously-affiliated, Christian, NPO. This participant was also attending a university that was affiliated with Catholicism. The participant, when queried about this choice, stated that it was made based on convenience rather than on the basis of the religious affiliation. The participant asserted that they did not have strong religious beliefs or affiliations. Religion, however, did play a significant role in the identity of one participant, who stated that the importance of religion increased as a result of participation in the Fukushima nuclear disaster response.

The role of religion in Japan is complex. Shintoism, Buddhism, and Christianity all play a part in the beliefs and history of Japan. The comments by the faculty and the participant that joined a religiously-affiliated NPO demonstrate an understanding, but weak belief in religion. The other participant, however, was the outlier among the group of participants in that the participant demonstrated a strong belief in religion. This strong belief was an important aspect of that participant's identity.

Summary

Chapter 4 presented the findings of the study on graduate student participation in the Fukushima nuclear disaster response. In total nine interviews were conducted. Three interviews were conducted with faculty members who oversaw graduate students, and six interviews were conducted with people who were graduate students at the time of participation in the nuclear disaster response. The intention was to discuss how graduate student involvement in a disaster response affected their academic and personal growth.

The general effect appears to have been positive. The participants reported increased engagement in academics towards goals that were easier to perceive. Participants also reported changes to relationships and many new relationships resulting from involvement. The discussion and conclusions in Chapter 5 are based on this data. Chapter 5 will discuss the background of the study, conclusions, implications for positive social change, and recommendations for future research related to DM.

Chapter 5: Discussion, Conclusions, and Recommendations

Introduction

The purpose of this study was to understand how the impact of involvement in the Fukushima nuclear disaster response affected graduate students. There were two areas that were of particular interest: academic performance and identity development. The intent of the study was to examine how participants who were graduate students at the time of their involvement perceived its impact on these two areas of interest.

The approach used for this study was transcendental phenomenology. Transcendental phenomenology involves setting aside preconceived notions and seeing the phenomenon through the perception and interpretation of the subjects (Moustakas, 1994, p. 33). This approach was chosen because the subjects could be seen as reliable observers, and the impact could not be measured except through the perception of the subjects. I interviewed six individuals who were graduate students at the time of involvement in the Fukushima nuclear disaster response. I further interviewed three faculty members who oversaw graduate students during their work in the Fukushima nuclear disaster response.

I was able to interview six participants. Four of the interviewees were male, and two were female. Five of the interviewees were Japanese nationals and one was a non-Japanese foreigner who had lived in the country for 8 years at the time of the disaster. Five of the participants lived near the disaster, with two within evacuation zones. The participants engaged in a range of activities. Two of the participants worked as logistical officers for DMATs, two worked with land reclamation and relocation projects, one

worked as an interpreter and translator, and one worked as a fundraiser. This provided a rich range of activity to understand a variety of areas where students were involved in the disaster response.

The interviews yielded several themes. The first theme was one of proximity. Students who lived near the disaster or associated more with the victims reported stronger connections and responses. The next theme to emerge was priorities. Students reevaluated their academic priorities and the value of the academic world in contrast with the world outside of academia. Finally, there were themes related to relationships. These themes ranged from breakdowns and changes to new relationships. Religion also emerged as a minor subtheme within the broader concept of relationships.

Interpretation of the Findings

In order to understand certain broad aspects of human nature, it is occasionally necessary to view those aspects through the lens of a specific phenomenon (Moustakas, 1994, p. 26). However, this requires that the researcher dismiss prior experience and objectively analyze the subjects perceptions of the phenomenon (Miller & Salkind, 2002, p. 152). By doing this, the researcher can derive from specific phenomenon a broader understanding of human experience (Bloor & Wood, 2006, pp. 129-130). For this research, the lens of the Fukushima nuclear disaster response was used to address two research questions:

RQ1 – How do graduate students perceive the impact of involvement in the Fukushima nuclear disaster response on their academic performance?

RQ2 – Qualitative: How does identity development occur in the context of experience in the Fukushima nuclear disaster response?

These two questions can be broken down into four key issues: proximity, stress, education, and identity. Examining how the data on those key issues relate to the existing literature will allow an understanding of the significance of the findings. It is also important to understand how those key issues tie into the four theories that were used to frame this research: empowerment, cognitive content engagement, general systems theory, and utilitarian ethics.

Proximity

In order to understand psychological risk, proximity is an important factor. Activities that brought response workers in closer proximity to death tended to have a stronger psychological impact (De Soir et al., 2012, p. 120). The participants did not report proximity to death, and a participant who was with a DMAT was surprised at the lack of need for acute care as compared to chronic and psychological care. However, there were other forms of proximity that did come into play.

The first form of proximity that came into play was the proximity to the disaster. The participants who were within evacuation areas reported stronger personal consequences including divorce, moving, and changing of careers. The participants who were within the Kanto and Tohoku regions, nearest the disaster, expressed the sentiment that the choice to participate was either easy, or easy to the point that it was not a choice. On the other hand, the participant from Kansai, further from the disaster, discussed a process of decision-making. This proximity to the disaster needs to be taken into account

when considering the invitation to participation. Students near the disaster site are more likely to choose to participate immediately, but because they may not give strong consideration to that decision, it is important that the choices they are given are reasonable.

The other form of proximity that came into play was proximity of identity. A participant involved in the care for health care workers found this particularly troubling. This appears to be because those individuals were in the same profession, and thus proximal to the participant's identity. Another participant noted that, because there were strong experiences following the disaster, there was a stronger sense of community. Furthermore, the participants who were helping their neighbors expressed strong sentiments relating to their communities. This connection to the community links the geographical and identity aspects of proximity. Thus, proximity can be seen as both a factor related to association and community, while it can also lead to increased stress.

Stress

Disasters, and involvement in the disaster response, can lead to stress. Among other psychosocial disorders, posttraumatic stress disorder is of specific concern (De Soir et al., 2012, p. 121; Guenther, 2012, p. 299). These disorders are particularly significant in that they can last for extended periods, sometimes more than 3 years, following a disaster (Wickrama & Ketring, 2012, p. 284). While none of the participants had been diagnosed with posttraumatic stress disorder or any other psychosocial disorders, the theme of stress did emerge.

The first place the theme of stress emerged was in the faculty interviews. One of the faculty noted that some of the students that had been involved in the disaster response occasionally became distant. Another faculty interviewee noted a specific case where a student “hit a wall” and needed to take some personal time. This suggests that, while none of these episodes came out in the participants I interviewed, that there were situations wherein students met their stress limits.

The participants who were graduate students did not discuss stress much. While there was some evidence, divorce, moving, and changing careers, as previously mentioned, it is also important to consider other themes when examining stress. The theme that stood out, in relation to stress, ties into the faculty interviewee who addressed detachment. There were several participants that expressed a sense of foreignness of the postdisaster landscape. While it is unclear whether there is a clear link between the perceived detachment of the landscape from the familiar and psychological detachment linked to stress, it is important to consider that this perception in and of itself represents a stressful environment. Furthermore, while the participants stated that they did not feel overwhelmed by their duties, many did state a sense of being overwhelmed by the situation they were in.

Stress is an important factor to understand when making a decision. In the case of disaster response, this is especially true. In the case of Fukushima, radiation provided a unique stressor that should be given extra consideration. One participant noted that many friends were afraid to be outside for extended periods because of concerns about radiation. On the other hand, another participant dismissed those concerns, stating that there was

enough distance between the participant's activities and the disaster that it was not a major concern. Radiation, because it cannot be seen and is often unmeasured, is a unique factor in nuclear disasters that requires special consideration when asking participants to join in activities.

The participants whom I was able to interview did not have as strong of stress reactions as the literature suggest may occur. This may be because participation was voluntary, and participants who had strong stress responses were less likely to participate. This could also be related to mitigating factors, such as briefing, debriefing, and strong support from faculty and friends.

Education

Education, when it is done well, prepares people for life outside of academia. This is also true for disasters. While every participant was involved in their first nuclear disaster response, a well-designed curriculum could have helped prepare them (Boone & Moore, 2011, p. s126). In fact, one participant had taken some courses related to disaster response.

The participant who had training in DM was one of the two participants who worked with a DMAT. The participant did not reflect any of the negative themes and called the opportunity to help a "特権 [privilege]." The student helped the team in medical record standardization and preparing those files for use by local clinics and other DMATs. The amount that this participant was able to contribute to the DMAT and the lack of negative themes in the participant's responses may not be a direct result of the courses in DM; however, those courses may have been a factor.

Identity

Identity is a social construct that is adopted on an individual letter to define how individuals reflect their self. The concept of identity is a social construct defined in a variety of ways (Gay, 2013, p. 202). Identity is particularly important in understanding individual development: academic or social. Therefore, it is important to understand that individual development is a function of the social concept of self, and community plays a fundamental role in how the individual develops.

Among the participants, the theme of community was quite common. This was particularly the case when it came to the community of people involved in the response efforts. Through this phenomenon, the participants became members of a new community through which they developed relationships. This new community allowed them to develop as individuals and become more mature intellectually and emotionally.

Empowerment

The first theory employed was empowerment. Empowerment is a theory that focuses on education towards critical thinking (Freire, 1973). In practice, empowerment may begin with education, but it extends much farther. Empowerment is about shifting the mechanisms of decision making and control to social networks that provide psychological support through a community (Ganapati, 2012, pp. 422-423). For empowerment to be effective, stakeholders must have a voice.

In this study, the key area where empowerment can be seen is in the access to opportunities. The participants were graduate students at the time of their involvement; however, they were given opportunities to provide help for others. This access to

opportunities allowed the participants to choose how they would help. Each participant chose a path that gave them the ability to provide aid and have a seat at the table.

One participant, however, argued that information about the availability of opportunities for graduate students was insufficient. The participant who had taken courses related to DM suggested that there was a greater need for support, and many people did not know that they could volunteer. The argument that information infrastructure needs to be improved is sound. It is plausible that more students would have been able to support the response had information been more available.

The experience of engagement in the Fukushima nuclear disaster response provided the participants with a sense of empowerment. In the case of a disaster on this scale, it is easy to become overwhelmed. Many of the participants addressed this feeling, but by taking control and becoming part of the response process, the students were able to do something. As one participant put it, "Providing the little amount of support I could provide was better than no support at all." This small effort allowed the students to become a part of the response and feed into the recovery. In short, they were empowered.

Cognitive Content Engagement

According to the theory of cognitive content engagement, learning occurs through the processing, repetition, and association formation of information (McLaughlin et al., 2005, pp. 9-11). For this processing to occur, there must be engagement with the subject matter. In order to produce this engagement, activities should be challenging, yet achievable (Kong & Hoare, 2011, p. 310). This theory of learning suggests that learning is a process that is not limited to the classroom. Furthermore, tasks outside of the

classroom may often be considered more effective than tasks inside the classroom. All that is required is repetition and engagement.

The participants were all engaged in a variety of activities. Some of the activities were more closely related to their studies than others. However, there is another key factor involved in the theory: association. Following the involvement in the disaster response, the students were more focused on the importance of life beyond graduation. In this model, this can be seen as a positive learning outcome because the participants could then associate classroom information with future applications, providing a foundation for engagement with the subject matter.

On the other hand, there was one participant who became apathetic to learning after participation in the disaster response. That participant did graduate; however, the negative learning outcome from the disaster provides a cautionary note. Participation in a disaster response does not guarantee cognitive engagement in coursework. The other accounts, however, suggest that there is some connection between cognitive engagement in the classroom and empowering activities outside of the classroom. It is also important to note that two of the participants chose to continue their education beyond the graduate program they were engaged in at the time of participation.

General Systems Theory

General systems theory argues that it is important to look at a system as a whole rather than at individual parts. While it is interesting to examine the specific roles played by the individual participants, it is also important to understand the participants as part of a larger socially cohesive system. To understand the system as a whole, one has to accept

that open systems are complex entities (von Bertalanffy, 1969, pp. 39-40). The different parts of the system do not need to acknowledge that they are interacting to interact with each other. In this case, there are several roles played by individuals in the system. The system requires funding, the system requires a communication network, and the system has to mitigate the damage done by the disaster.

Furthermore, this system is not a predesigned system; it is an ad hoc system. There were areas where preparation occurred; the formation of DMATs is an example. However, the participants who joined the DMATs in this study were nor members prior to the disaster. They, like all the other participants, played their part in a system that emerged spontaneously and instantaneously, the moment the disaster struck. The system did evolve, but it began forming when the tsunami warning was sounded.

The participant who became part of a student-led funding campaign is a good entry point to the system. The role of a fundraiser is often seen as peripheral to the larger system. However, the system requires funding to meet its needs for personnel and material. Without the fundraiser, the system will starve. The government played a role in funding, as did NPOs; however, there is always a greater need for funding than there is a supply.

The next role is that of communication. In ad hoc networks, there is no unified group culture. This lack of a collective mindset makes it difficult for ad hoc networks to function without good communication (Kapucu, Arslan, & Collins, 2010, p. 226). A network is necessary for managing this internal communication (Caruson & MacManus, 2011, p. 349). One participant who stands out in this capacity was the participant who

was acting as a translator and interpreter. These roles are necessary for the minority population of non-Japanese residents who were also affected by the disaster. Furthermore, by supporting this minority group's needs, the larger group can more effectively work within a common system. Another participant who played an important role in this regards was the participant who, as a member of a DMAT, helped with the standardization of medical records in the disaster zone. The participant stated that, prior to those activities, medical records had been transmitted orally. This leads to degradation of records and a difficulty in the transferring of patients. By standardizing medical records, the participant played a key role in unifying the language of the ad hoc network.

The mitigation of damage done by the disaster is the role of the system that is most often addressed in public discourse regarding disaster response activities. This is an important area of concern that relies on the fundraising and communication to function. In this study, four participants represented experiences in this aspect of disaster response. The two participants that were involved in DMATs and two participants that were involved in land reclamation and refugee relocation were active in this area of the disaster response. The movement of people outside the disaster zone is an important mitigation strategy. The fewer people in the disaster zone the easier it becomes to address the concerns of the sick or injured. The participants in the DMATs played logistical roles, but were part of the mechanism for transporting medicine and providing health care within the affected area.

Individually, these activities are each important, however it is essential to look at the entire system to understand the value of each participant's role. Furthermore, it is by

examining the participants as part of a system that we can understand that their disparate activities were all part of the same phenomenon which defined a shared experience. As one participant suggested, it may be difficult for them to share their experiences, but because they all had experiences and acknowledge that those unspoken experiences were part of the same phenomenon, there is a greater sense of community. These participants were part of a whole, an ad hoc system designed specifically to address a nuclear disaster.

Utilitarian Ethics

Valuating a system requires a system of values. To be able to understand the value of the system and the value of individual participation I chose the lens of utilitarianism. Utilitarianism can be seen as doing the most good and the least harm (Mill, 1863). In using this system, it is important to consider not only the events as they occurred, but potential future impacts of decisions made. A participant who chooses to aid an individual at risk of personal harm may be acting in an unethical manner. Such a choice may save the life of the person they were trying to save, but it may also put the participant at risk resulting in the need for other response workers to save them. As such, it is essential to consider personal risk when making decisions in a disaster zone (Akabayashi et al., 2012, p.698). In this manner the utilitarianism diverges from altruism because the initiator is part of the equation. This system of ethics also works well with general systems theory because it requires an examination of the systematic repercussions of decisions. In those regards there is a need to consider the value of participation for the participants and for the system. Furthermore, it is essential to consider the long-term impacts on the individual as they enter society.

The value of participation for the individuals brings us back to empowerment. Because the participants were able to take part in the system they were able to transform the feeling of being overwhelmed to a feeling of empowerment. This transformative experience is related to the participants' ability to make choices, rather than have choices made for them; and take actions, rather than being the recipient of actions taken on their behalf. While I suggested caution, it is important to note that participation in a disaster response can be an empowering experience. On the other hand, that note of caution is important to remember. Disaster zones pose health risks; and involvement in a disaster response poses psychological risks. So, it is important to balance the risk and the reward through systems in place to protect the psychological and physical health of participants.

The system also benefited from the participation of these graduate students. The students were able to self-select activities that they were capable of. Because none of the students were placed in situations where they were out of their depth, they did not hinder the smooth operation of the broader system. To the contrary, each participant played a fundamental role in the functioning of the broader system, as was explored under the discussion of general systems theory.

Finally, the issue of the long-term impacts on the individual as they enter society must be considered. This is a much more difficult question to address. As was discussed under cognitive content engagement, most of the participants had a greater engagement in their studies and were more focused on postgraduation activities. Furthermore, the participants discussed a broad sense of community developed through their activities. This sense of community is fundamental for society. Finally, these participants now have

experiences with disaster response. In a world of global climate change and an increase in the potential for natural disasters, this experience could be valuable in the future.

Taking these three factors into consideration, it appears that in the situation of these participants, it was valuable for them to have engaged in the Fukushima nuclear disaster response. The benefits to the participants, system, and victims of the disaster outweighed the risks engaged in by the participants.

Limitations

The complexity of the disaster lent itself to a broad response. There were many people involved in the response, many of them graduate students. However, a theme that emerged when discussing the activities with the interviewees helped me understand why so few responded. The respondents minimized their role in the disaster response. Even the participants that were members of disaster medical assistance teams felt that the role they played was not significant enough. While I was able to find a broad spectrum of participants, there are many other people who participated but have not had their voices heard. Because of the small sample size there are some themes that may not have emerged but would emerge in accounts by other participants. While the themes that did emerge appear to help to define the broader experience, this may not always be the case. Furthermore, these case studies are specific to Japanese culture, the theme of religion, in particular, is likely to be very different in America or other countries. That religion did appear in the interviews is significant as the researcher did not expect religion to play a role.

The bias of the researcher must always be considered when discussing the limitations of any research. In this case, the researcher attempted to isolate and diminish bias by preparing responses that, the researcher felt, were probable or improbable. By being open with bias, the research may have averted introduction of bias into the results. However, the case of omission may also be considered. The researcher did not include questions related to religion because of the researches assumptions of Japanese culture. This may have led to early respondents not having the opportunity to express information on that theme.

However, despite these limitations, the research attempted to find the most applicable themes that could be tied to past literature while opening the door for future research.

Recommendations for Future Research

When disasters occur, it is important to research the disaster as well as the response. This allows for a better understanding of the efficacy of different methods of responding to a disaster. This study focused on the role of graduate students in those responses and provided an understanding of how graduate students contributed to those efforts and were affected by their participation. This perspective also suggested that there were areas of disaster response research that needed to be examined more closely. In those regards, there are five areas of inquiry that deserve further study: undergraduate and graduate involvement in disaster recovery, the role of translators and interpreters in disaster response, DM curriculum development, the effects of briefing and debriefing on mitigating posttraumatic stress disorder, and universities as a disaster infrastructure asset.

These areas of research could be useful in better understanding disasters towards mitigation of the harm from disasters in the future.

The focus of this study was on graduate students who played a role during the response to the disaster. The period following the response, recovery, offers a different set of challenges and a larger group of participants to study. As such, undergraduate and graduate involvement in disaster recovery may offer further insight into the roles students can and do play in responding to disasters. This area of study offers a broader range of participants and could be broken down into several phenomenological studies related to specific roles.

One of the participants played a role I did not expect to find, the role of translator and interpreter. This is a crucial role for the support of at-risk populations of foreign language speakers in a disaster zone. The participant took on this role because it was otherwise not being occupied. This suggests that there may be a greater need for people to fill this role in the future. This role is also important for foreign nonprofit organizations coming to the aid of a nation with a different language. While these two roles are similar, they are also quite different. The role played by the participant of this study was focused on the aid of an at-risk population. On the other hand, a translator or interpreter working with an NPO is facilitating interaction with the general population. Both of these roles are important and merit further study. The question as to whether to separate the roles or combine them for the purpose of research is valid, and also deserves consideration. This research would require a case study approach, to achieve a broad contextualized understanding of these complex roles.

One of the participants had taken coursework related to DM. The role of a DM curriculum in medical schools is an important role to consider. This may require several case studies and possibly quantitative research. First, it would be important to do institutional case studies on the programs that exist in order to understand how they were developed and what their goals are. This institutional case study could be followed up with studies of graduates of those programs that went on to be involved in disaster response and recovery efforts. If a large enough sample size can be reached, it may be possible to do quantitative research to correlate the preparedness of individuals to different aspects of the curriculums.

An area that I may not have explored deeply enough was the effects of briefing and debriefing on mitigating posttraumatic stress disorder. This was, in part, because the participants did not exhibit signs of posttraumatic stress, and did not go in depth in the briefing or debriefing process. On the other hand, the role of briefing to prepare individuals for entering a high stress situation, and debriefing to mitigate the impact of that situation is broadly accepted but may be underresearched. This is an area that lends itself to a narrative approach.

All of these topics lend themselves to a broader, overarching theme, universities as a disaster infrastructure asset. In this study, the role of graduate students as individual assets to disaster response was informative. On the other hand, the question of what role universities could play more broadly given a larger role in disaster response is one of particular interest. This topic lends itself to action research, but would likely require a large research team. There are two reasons that a large research team would be needed.

First, it would be necessary to implement a disaster curriculum across the curriculums of universities across a broad area. The reason for this is that, as was the case in the current study, those closest to the disaster are the most likely to choose to respond immediately. By covering a broad area, the possibility of one of the member institutes being near a disaster increases. Furthermore, the broad area allows for the formation of networks for the transfer of medical supplies and other necessary material. This project would likely take an action research approach.

This study addressed the two key research questions, but opened the door for new research. The areas of research addressed focus on two major themes: the protection of at-risk populations and the improvement of disaster infrastructure. As global climate change increases the chance for disasters, disaster mitigation and response needs to be a priority for governments and researchers. It is important that action is taken, but action without knowledge is likely to fail.

Implications for Positive Social Change

The stated purpose of this study was to improve understanding of how graduate level university students perceive the impact of involvement in DM during the response phase following the Fukushima nuclear disaster in terms of personal and academic growth, as aspects of identity. This is a complex issue that lent itself to a broad systematic approach to understanding the roles that graduate students played, and how those roles impacted those students' lives. The results of this research demonstrate that there are very positive aspects to participation in disaster response by graduate students, such as empowerment and increased academic engagement. On the other hand, there were reports

by the faculty interviews of severe stress. One of the faculty interviewees cautioned that it would be difficult to prove a link, but it is important to consider as a possibility.

These findings promote an expansion of the role of graduate students with improved briefing procedures. Graduate students who were near the disaster responded immediately and effectively. The positive contributions of those students possibly saved lives. On the other hand, one of the participants became displaced and divorced. Thus it is important to provide a complete picture of the risks and stresses involved in a disaster response before a graduate student consents to participate. Even with this information available, it is likely that those closest to the disaster will not give deep enough consideration to the risks. The risks they face also increase because they are more likely to have community connections that will increase the impact of stressful situations. For students nearest the disaster it may be necessary to limit the roles they are allowed to take in order to mitigate these risks.

This broader understanding suggests that graduate students can help to mitigate the effects of disasters. Furthermore, the understanding of how disaster response efforts affect graduate students can help mitigate those effects. While teacher-student power dynamics need to be taken into consideration, graduate student engagement should be considered. If engagement can be increased while providing improved support, it will produce a positive social change through improved disaster infrastructure that takes into consideration the risks that graduate students need to consider as a specific and unique population.

Conclusion

The failure of the Fukushima Daiichi nuclear power plant was part of a broader disaster than included an earthquake and tsunami. The devastation caused by the natural disasters were of less concern than the manmade disaster that brought into question the role of nuclear energy in the world (Funabashi & Kitazawa, 2012, p. 11). It is clear that it Fukushima was a manmade disaster resulting from a combination of poor management working against moving reactors and raising higher seawalls in addition to the exploitation of underpaid temporary workers (Shrader-Frechette, 2012, p. 135) who were unable to respond to the disaster (Funabashi & Kitazawa, 2012, p. 13). The age of the nuclear reactor was also of concern as nuclear decay makes the walls of reactors brittle after extended use. This suggests that there were governmental issues with lack of appropriate oversight. As natural disasters have doubled over the last decade and continue to increase at an accelerating rate (Kagawa & Selby, 2012, p. 208), nuclear power, often suggested as an alternative to greenhouse-gas emitting power alternatives, has become much less viable.

The impact of this disaster was felt in Japan, but also across the world as energy policy shifted. The shift is likely for the long-term improvement of society as a whole as solar, wind, and tidal energy become more prevalent. An additional benefit that can be gained from this disaster is a shift in how disaster infrastructure is perceived. The key asset in a disaster is the people who work to implement the disaster response. This study has shown that graduate students are capable of playing key roles in that disaster response. This represents an opportunity to expand the number of people that are involved in

disaster response and to better mitigate future disasters. The empowerment of graduate students to become involved in this activity allows them to become better students and better people.

It is my hope that through publication of this research I can help with the decision to better implement disaster studies as a portion of graduate school work. Furthermore, this offers the opportunity for universities to become a brick and mortar infrastructure for disaster preparedness that is cost-effective and sustainable. There will be future disasters, but there is hope that those future disasters can be better mitigated, in part, through the knowledge gained by this study.

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Appendix A: Faculty Instrument

Section I: Predisaster self-reflection

Starting prompt: What were you doing in the week before the Fukushima nuclear disaster?

東日本大震災の前の一週間の日常生活について教えていただけますか？

Follow-up strategy: Focus on interactions with other people, academic activities, and comparisons between the past and present identity.

Section II: Experience of the Fukushima nuclear disaster response

Starting prompt: How did you decide to participate in the Fukushima nuclear disaster response?

福島第一原子力発電所事故災害対応（さいがいたいおう）の支援はどのように決定しましたか？

Follow-up strategy: Focus on interactions with students. If researcher follows into descriptions of activities ignore the second starting prompt.

Starting prompt: What activities were you involved in during the Fukushima nuclear disaster response?

福島第一原子力発電所事故災害対応について何をしましたか？

Follow-up strategy: Focus on interactions with students. Be cautious about stress signals. Do not push too hard to obtain further information.

Section III: Academic disposition of potential participants

Starting prompt: Did you see any change in the academic work of students that participated after they returned to school??

生徒の勉強や授業のやり方は支援の前と後では同じでしたか、それとも変わった所がありましたか？

Follow-up strategy: Explore the impacts of stress as well as connections between experience in the Fukushima nuclear disaster response and academic studies.

Section IV: Social disposition of potential participants

Starting prompt: Were there any episodes which implied that the students who participated had changed as a person?

生徒は友人や家族との関係は災害対応の前と後では変わりがありましたか？

Follow-up strategy: Explore interactions and comparisons between the past and the postinvolvement social disposition.

Appendix B: Student Instrument

Section I: Predisaster self-reflection

Starting prompt: What were you doing in the week before the Fukushima nuclear disaster?

東日本大震災の前の一週間の日常生活について教えていただけますか？

Follow-up strategy: Focus on interactions with other people, academic activities, and comparisons between the past and present identity.

Section II: Experience of the Fukushima nuclear disaster response

Starting prompt: How did you decide to participate in the Fukushima nuclear disaster response?

福島第一原子力発電所事故災害対応（さいがいたいおう）の支援はどのように決定しましたか？

Follow-up strategy: Focus on interactions with superiors. If student follows into descriptions of activities ignore the second starting prompt.

Starting prompt: What activities were you involved in during the Fukushima nuclear disaster response?

福島第一原子力発電所事故災害対応について何をしましたか？

Follow-up strategy: Focus on interactions with superiors as well as role in the system. Be cautious about stress signals. Do not push too hard to obtain further information. If focus is on the positive seek aspects of the negative and vice versa.

Section III: Academic repercussions

Starting prompt: How did you approach your graduate school activities when you returned?

勉強や授業のやり方は支援の前と後では同じでしたか、それとも変わった所がありましたか？

Follow-up strategy: Explore the impacts of stress as well as connections between experience in the Fukushima nuclear disaster response and academic studies.

Section IV: Social repercussions

Starting prompt: How did your friends or family respond to you after you returned?

友人や家族との関係は災害対応の前と後では変わりがありましたか？

Follow-up strategy: Explore interactions and comparisons between the past self and the postinvolvement self.

Appendix C: Informed Consent

Faculty consent form

CONSENT FORM

You are invited to take part in a research study of how graduate students were affected by involvement in the Fukushima nuclear disaster response. The researcher is inviting graduate school researchers who helped out following the Fukushima nuclear disaster and subsequently published articles about the response to be in the study. This form is part of a process called “informed consent” to allow you to understand this study before deciding whether to take part. This study is being conducted by a researcher named Sean Gay, who is a doctoral student at Walden University.

Background Information:

The purpose of this study is to increase understanding of how graduate students learn and develop while involved in nuclear disaster response.

Procedures:

If you agree to be in this study, you will be asked to:

 Discuss your observations of former students for a period of one hour

 You may be asked for up to two more follow-up interviews not exceeding half an hour

Here are some sample questions:

What were you doing in the week before the Fukushima nuclear disaster?

How did you decide to participate in the Fukushima nuclear disaster response?

What activities were you involved in during the Fukushima nuclear disaster response?

Did you see any change in the academic work of students who participated in the disaster response after they returned to school?

Were there any episodes which implied that a student participating in the disaster response had changed as a person?

Voluntary Nature of the Study:

This study is voluntary. Everyone will respect your decision of whether or not you choose to be in the study. If you decide to join the study now, you can still change your mind during or after the study. You may stop at any time.

Risks and Benefits of Being in the Study:

As you will be discussing possibly traumatic experiences that may trigger responses, you may experience risks, such as psychological distress. This study seeks to improve understanding of the impact of involvement in nuclear disaster response. This information is fundamental for improving informed consent for future graduate students seeking to engage in disaster relief. Furthermore, university engagement in disaster response may play a role in improving disaster infrastructure in general.

Services available:

The following is a list of free/low-cost counseling services available should any issues arise during or following the interview:

Fukushima Rehabilitation Psychology Educational Clinic Center

Center Address: All Japan Real Estate Association Fukushima Headquarters. 1-45 Minami, Koriyama, Fukushima. 963-0015.

Executive office: PAS Institute for Psychoanalytic-Systems Psychotherapy NPO. 2-8-9 Komaba, Meguro, Tokyo. 153-0041. (Attn: Mr. Nakamura or Mr. Hashimoto)

Phone: 03-6407-8201 Mobile: 080-3606-0640

Payment:

There is no compensation being offered for participation.

Privacy:

Any information you provide will be kept confidential. The researcher will not use your personal information for any purposes outside of this research project. Also, the researcher will not include your name or anything else that could identify you in the study reports. Data will be kept secure by digital password protection and keeping the data storage devices in a secure physical location. Data will be kept for a period of at least 5 years, as required by the university.

Contacts and Questions:

You may ask any questions you have now. Or if you have questions later, you may contact the researcher via XXX. If you want to talk privately about your rights as a participant, you can call Dr. Leilani Endicott. She is the Walden University representative who can discuss this with you. Her phone number is +1-612-312-1210 (international). Walden University's approval number for this study is **05-08-14-0326903** and it expires on **April 27, 2016.**

Please print or save this consent form for your records.

Statement of Consent:

I have read the above information and I feel I understand the study well enough to make a decision about my involvement. Replying to this email with the words, “I consent”, I understand that I am agreeing to the terms described above.

Printed Name of Participant _____

Date of consent _____

Participant’s written or electronic signature _____

Researcher’s written or electronic signature _____

同意書

大学院生の福島第一原子力発電所事故災害対応の関与ではどの影響を受けたかに付いての研究へ招待します。福島第一原子力発電所事故災害対応に関与した研究論文を発表した大学院の講師にお願いします。この同意書は研究を関与する決定の前に研究を理解して同意するため、「インフォームドコンセント」を受けるものです。この研究は Gay Sean、Walden 大学の博士課程学生によって実施されています。

背景情報：

本研究の目的は原子力災害対応で大学院生の学びや発達の理解を増やすことです。

手順：

本研究を同意していただくと：

□ 元生徒の経験について一時間ほど話し合ってもらいます

□ 必要であれば、また二つの３０分のフォローアップインタビューをお願いします

質問の実例：

東日本大震災の前の一週間の日常生活について教えていただけますか？

福島第一原子力発電所事故災害対応の支援はどのように決定しましたか？

福島第一原子力発電所事故災害対応について何をしましたか？

生徒の勉強や授業のやり方は支援の前と後では同じでしたか、それとも変わった所がありましたか？

生徒は友人や家族との関係は災害対応の前と後では変わりがありましたか？

研究の自発的な特性：

本研究は任意です。研究を選択したかどうかは個人の意思を尊重します。本研究の参加にいったん同意した後でも，途中で研究参加への同意を撤回することができます。その場合、その時点までのデータの使用の有無を選択することもできます。

研究に入ることの危険と利点：

外傷的な経験について相談することもあるので心理的な問題を起こす恐れがあります。本研究の目的は原子力災害対応で大学院生の学びや発達の理解を増やすことです。この研究から得られた情報は未来の大学院生のインフォームドコンセントを改善します。なお防災インフラ整備の役割を果たす可能性があります。

利用可能なサービス：

もし、研究の途中や後に必要になれば、この一覧のカウンセリングサービスがあります（無料、または低価格）：

福島復興心理・教育臨床センター

センター所在地： 〒963-0115 福島県郡山市南一丁目45 番地 公益社団法人 全日本不動産協会 福島県本部内

事務局： 〒153-0041 東京都目黒区駒場2-8-9 PAS 心理教育研究所 非営利事業部（担当：中村・橋本）

電話： 03-6407-8201 携帯電話：080-3606-0640

謝礼：

参加していただくことに対する謝礼はありません。

プライバシー：

情報は機密に保持します。個人情報は本研究以外には使われません。個人を特定できる情報が論文に使うことは一切ありません。データはパスワードのファイルに保存の上、鍵のかかった場所に保存ます。データは大学院の義務通りに５年間を保持します。

連絡先と質問：

今、質問があればしてください。もし、後に質問があれば XXX に連絡してください。参加者としての権利で個人的に相談をしたい場合はWalden 大学のEndicott Leilani 博士に連絡できます。電話番号は+1-612-312-1210 extension 1210（国際）。Walden 大学の承認番号は**05-08-14-0326903**に2016年04月27日期限が切れます。

この同意書は自分の記録の為に印刷または保存しておいてください。

同意の声明：

上記の情報を読んで関与について、決定できるに十分の研究を理解できました。

「同意する」のメールの返信をして上記の条項を同意します。

参加者の氏名 _____ ㊞

同意の日付 _____

研究者の氏名 Sean Eric Kil Patrick Gay ㊞

Student consent form

CONSENT FORM

You are invited to take part in a research study of how graduate students were affected by involvement in the Fukushima nuclear disaster response. The researcher is inviting former graduate students who helped out following the Fukushima nuclear disaster to be in the study. This form is part of a process called “informed consent” to allow you to understand this study before deciding whether to take part. This study is being conducted by a researcher named Sean Gay, who is a doctoral student at Walden University.

Background Information:

The purpose of this study is to increase understanding of how graduate students learn and develop while involved in nuclear disaster response.

Procedures:

If you agree to be in this study, you will be asked to:

 Discuss your experiences for a period of one hour

 You may be asked for up to two more follow-up interviews not exceeding half an hour

 Emails, letters, blog posts, or Tweets from the period of your participation will be requested

Here are some sample questions:

What were you doing in the week before the Fukushima nuclear disaster?

How did you decide to participate in the Fukushima nuclear disaster response?

What activities were you involved in during the Fukushima nuclear disaster response?

How did you approach your graduate school activities when you returned?

How did your friends or family respond to you after you returned?

Voluntary Nature of the Study:

This study is voluntary. Everyone will respect your decision of whether or not you choose to be in the study. If you decide to join the study now, you can still change your mind during or after the study. You may stop at any time.

Risks and Benefits of Being in the Study:

As you will be discussing possibly traumatic experiences that may trigger responses, you may experience risks, such as psychological distress. This study seeks to improve understanding of the impact of involvement in nuclear disaster response, providing a foundation for what improvements can be made for graduate students seeking to engage in disaster relief. Furthermore, university engagement in disaster response may play a role in improving disaster infrastructure in general.

Services available:

The following is a list of free/low-cost counseling services available should any issues arise during or following the interview:

Fukushima Rehabilitation Psychology Educational Clinic Center

Center Address: All Japan Real Estate Association Fukushima Headquarters. 1-45 Minami, Koriyama, Fukushima. 963-0015.

Executive office: PAS Institute for Psychoanalytic-Systems Psychotherapy NPO. 2-8-9 Komaba, Meguro, Tokyo. 153-0041. (Attn: Mr. Nakamura or Mr. Hashimoto)

Phone: 03-6407-8201 Mobile: 080-3606-0640

Payment:

There is no compensation being offered for participation.

Privacy:

Any information you provide will be kept confidential. The researcher will not use your personal information for any purposes outside of this research project. Also, the researcher will not include your name or anything else that could identify you in the study reports. Data will be kept secure by digital password protection and keeping the data storage devices in a secure physical location. Data will be kept for a period of at least 5 years, as required by the university.

Contacts and Questions:

You may ask any questions you have now. Or if you have questions later, you may contact the researcher via XXX. If you want to talk privately about your rights as a participant, you can call Dr. Leilani Endicott. She is the Walden University representative who can discuss this with you. Her phone number is +1-612-312-1210 (international). Walden University's approval number for this study is **05-08-14-0326903** and it expires on **April 27, 2016.**

Please print or save this consent form for your records.

Statement of Consent:

I have read the above information and I feel I understand the study well enough to make a decision about my involvement. Replying to this email with the words, "I consent", I understand that I am agreeing to the terms described above.

Printed Name of Participant _____

Date of consent _____

Participant's written or electronic signature _____

Researcher's written or electronic signature _____

同意書

大学院生の福島第一原子力発電所事故災害対応の関与ではどの影響を受けたかに付いての研究へ招待します。福島第一原子力発電所事故災害対応を大学院生の間に関与した元大学院生にお願いします。この同意書は研究を関与する決定の前に研究を理解して同意するため、「インフォームドコンセント」を受けるものです。この研究は Gay Sean、Walden 大学の博士課程学生によって実施されています。

背景情報：

本研究の目的は原子力災害対応で大学院生の学びや発達の理解を増やすことです。

手順：

本研究を同意していただくと：

□ 自分の経験について一時間ほど話し合ってもらいます

□ 必要であれば、また二つの３０分のフォローアップインタビューをお願いします

□ 福島第一原子力発電所事故災害対応の時のメール、手紙、ブログ、ツィッターなどを見せていただくことがあります。

質問の実例：

東日本大震災の前の一週間の日常生活について教えていただけますか？

福島第一原子力発電所事故災害対応の支援はどのように決定しましたか？

福島第一原子力発電所事故災害対応について何をしましたか？

勉強や授業のやり方は支援の前と後では同じでしたか、それとも変わったところがありましたか？

友人や家族との関係は災害対応の前と後では変わりがありましたか？

研究の自発的な特性：

本研究は任意です。研究を選択したかどうかは個人の意思を尊重します。本研究の参加にいったん同意した後でも，途中で研究参加への同意を撤回することができます。その場合、その時点までのデータの使用の有無を選択することもできます。

研究に入ることの危険と利点：

外傷的な経験について相談することもあるので心理的な問題を起こす恐れがあります。本研究の目的は原子力災害対応で大学院生の学びや発達の理解を増やすことです。この研究から得られた情報は未来の大学院生の災害対応経験を改善します。なお防災インフラ整備の役割を果たす可能性があります。

利用可能なサービス：

もし、研究の途中や後に必要になれば、この一覧のカウンセリングサービスがあります（無料、または低価格）：

福島復興心理・教育臨床センター

センター所在地： 〒963-0115 福島県郡山市南一丁目45 番地 公益社団法人 全日本不動産協会 福島県本部内

事務局： 〒153-0041 東京都目黒区駒場2-8-9 PAS 心理教育研究所 非営利事業部

（担当：中村・橋本）

電話： 03-6407-8201 携帯電話：080-3606-0640

謝礼：

参加していただくことに対する謝礼はありません。

プライバシー：

情報は機密に保持します。個人情報は本研究以外には使われません。個人を特定できる情報が論文に使うことは一切ありません。データはパスワードのファイルに保存の上、鍵のかかった場所に保存ます。データは大学院の義務通りに５年間を保持します。

連絡先と質問：

今、質問があればしてください。もし、後に質問があれば XXX に連絡してください。参加者としての権利で個人的に相談をしたい場合はWalden 大学のEndicott Leilani 博士に連絡できます。電話番号は+1-612-312-1210 extension 1210（国際）。Walden 大学の承認番号は**05-08-14-0326903**に2016年04月27日期限が切れます。

この同意書は自分の記録の為に印刷または保存しておいてください。

同意の声明：

上記の情報を読んで関与について、決定できるに十分の研究を理解できました。

「同意する」のメールの返信をして上記の条項を同意します。

参加者の氏名 _____ ㊞

同意の日付 _____

研究者の氏名 Sean Eric Kil Patrick Gay ㊞