Fostering children's participation in Disaster Risk Reduction with LEGO

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Abstract

Children represent a highly vulnerable group who are disproportionately affected by disasters each year. Disaster Risk Reduction (DRR) is the process of identifying, analysing and reducing the impact and risk of disasters on the human population. DRR has traditionally been dominated by top-down or 'technocratic' efforts, which is based on the transfer of 'expert' knowledge onto local communities. Participatory initiatives and research emerged as an alternative method to empower the powerless and provide a platform for vulnerable groups to have their voice and knowledge heard in the field of DRR. However, participatory initiatives have historically targeted an adult audience. Children's participation and knowledge has largely gone unquestioned as it challenges many deep rooted political and cultural norms that are entrenched into our societies and institutions. As a result, limited research has been conducted into the role of children as communicators and participants of DRR. The current understanding of children's knowledge and capacities is significantly incomplete and there is still much to learn about how children can add value to DRR planning and management. The purpose of this thesis is to assess the use of participatory mapping using LEGO, as a tool to foster genuine participation and produce children's knowledge within DRR. This research adds to the limited body of research in this field to deepen our understanding of children's knowledge and capacities.

The chosen research methodology for this thesis was participatory research. Ethnography was used at times as the two approaches allowed for a deeper qualitative analysis of the knowledge produced. Participatory three-dimensional mapping with LEGO bricks was conducted in partnership with 13 students aged 10-12 years to foster participation, produce knowledge and conduct risk assessment. A total of 10 90-minute sessions over the course of two months (March–April, 2018), were set aside for the children to build their three-dimensional map of their community. One on one interviews and a final reflection focus group with the children and school teachers was also conducted. Each session was audio recorded and transcribed, with thematic analysis been done in collaboration with the children.

The results demonstrated that LEGO mapping, in the context of New Zealand and a primary school caught the immediate attention and interest of all children involved. The methodology encouraged a natural process of play that enabled active participation. LEGO mapping did not require any preliminary requirements and was accessible to all levels of ability and background within the group. Over the course of the field work the students produced a three-dimensional map that was 190cm x 114cm which represented 3.12km x 1.92km of their Maraekakaho community, as defined by the children. The map was to scale and was an interactive, colourful and creative display of how they viewed their community and community risks. LEGO mapping did however pose several challenges both for the children and facilitator. Many of the limitations revolved around the technical aspects when building with the LEGO brick such as: shape, size, colour, quantity and time. Such aspects had an unexpected domino effect on the bigger concepts within this thesis as the technical limitations would hinder progress and students would at times lose momentum. As a result, participation could at times felt burdensome to the students and they would lose interest in what knowledge was or was not included on the map.

This research and the discussion produced from this research revealed that LEGO mapping has the potential to both harness and produce children's knowledge in the field of DRR. While the technical limitations of LEGO need to be considered carefully for any future research, along with which communities the tool it used with this research provided a practical investigation into the various capacities that children have and their ability to undergo risk assessment. It is the hopes of this

research to encourage other researchers to pursue and advance the agenda of children's participation in DRR in other innovative and creative ways.

Keywords: Children; participation; disaster risk reduction; participatory three-dimensional mapping; LEGO; Hawke's Bay; New Zealand.

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Attestation of Authorship

I hereby declare that this submission is my own work and that, to the best of my knowledge and belief, it contains no material previously published or written by another person (except where explicitly defined in the acknowledgements), nor material which to a substantial extent has been submitted for the award of any other degree or diploma of a university or other institution of higher learning.

Signed: _____ Date 11.01.19

Nickola Loodin

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Abbreviations

AUT: Auckland University of Technology

CDEM: Civil Defence Emergency Management

CRED: Centre for Research on the Epidemiology of Disasters

DRR: Disaster Risk Reduction

ECL: East Coast Labs

MOE: Ministry of Education

MBIE: Ministry of Business and Innovation

UN: United Nations

UNICEF: United Nations International Children's Emergency Fund

UNISDR: United Nations International Strategy for Disaster Risk Reduction

Chapter One: Introduction

The children and youth are increasingly exposed to a variety of disasters both from unpredictable weather events and man-made actions (Wisner et al., 2018; Feng, Hossain & Paton, 2017; United Nations International Children's Emergency Fund [UNICEF], 2016). The United Nations International Strategy for Disaster Risk Reduction [UNISDR] (2017) defines a disaster as a hazardous event that causes serious disruption to the function of a community or society. These hazardous events can be caused by natural processes that can either have a slow or rapid onset such as: earthquakes, landslides, tsunamis, hydrological (floods), climatological (extreme temperatures), meteorological (cyclones) or biological (disease epidemics) (UNISDR, 2018). Disaster risk reduction [DRR] aims to reduce the damage caused by natural hazards such as earthquakes, floods or droughts through an ethic of prevention (UNISDR, 2018). In theory DRR strategies and management should be a process that integrates a variety of people's opinions, views and perspectives (UNISDR, 2015; Gaillard et al., 2015). However, in reality there remains a significant gap between those 'insiders' who are immediately at risk (e.g., local governments, communities, schools and children) and those who sit on the 'outside' (e.g., scientists, international organisations and national governments).

Children have historically been excluded and disassociated from DRR knowledge and decision making, and when children are discussed in DRR it is often with a 'victim lens' (Peek, 2008; Anderson, 2005; UNISDR, 2015). Fostering children's participation and integrating their knowledge in DRR is particularly challenging for a variety of reasons. There is a common perception within DRR that children lack the capacity to raise wider community disaster risk priorities nor should they have to (Brown, 1998; Alderson, 1995; Gibbs, Mutch, O'Connor, & MacDougall, 2013). The concept of children's participation (not just within DRR) challenges many deep rooted cultural, political and even child rearing norms (Hart, 1986). For this reason, research into children's capacities and knowledge in the field of DRR has lagged.

Despite the challenges around children's participation in DRR, the children and youth of today will inherit the consequences of the actions and inactions of today (UNICEF, 2016). Therefore, it is crucial that children are empowered and given the opportunity to participate in DRR activities not only to decrease their own disaster risk but in order to create more sustainable and inclusive DRR strategies. The purpose of this thesis is to advance the agenda of including children in DRR research and initiatives. The way in which this research does this is by testing the use of LEGO, a toy that is ubiquitous within Western cultures, as a tool to foster children's participation in DRR. The hypothesis of this research is that the interlocking LEGO brick can both harness children's participation and be used to build a three-dimensional map of their defined community. The knowledge, dialogue and participation produced from this process can be used to bridge the gap between stakeholders and transform children's knowledge into action within DRR.

This introductory chapter will lay the foundations of this thesis and provide an overview of the research journey, aims and objectives. The purpose of this thesis is to critically examine the effectiveness of LEGO mapping, as a tool to foster children's participation in DRR. The first section of this chapter will present a brief history of children in DRR, and strategies used in DRR to integrate a variety of people's knowledge such as participatory mapping. Section two will provide insight into the rationale and reason behind using LEGO. The third section of this chapter will paint a picture of the research journey, by first stating the research question, objectives and outline where the research took place and reiterate the significance of this research. The fourth and final section of this chapter will provide an overall structure for this thesis and the five chapters that follow.

1.1 *Background:*

Children represent a considerable proportion of those who are affected by disasters (Peek, 2008). It is estimated that each year 175 million children around the world are affected, with 9 million boys and girls forced out of school due to disaster and emergencies in 2014 alone (SENDAI, 2015; Save the Children, 2014). Despite these figures, research, institutions, governments and non-government organisations [NGOs] that work within the field of DRR have historically overlooked children's experiences, capacities and needs in the face of disasters (Peek, 2008; Mitchell et al., 2009). It is argued that the lack of focus on children is due to the common yet erroneous assumption that children's reactions are fleeting and therefore they are not seriously affected by the consequences of natural hazards (La Greca et al. 2002; La Greca, Silverman, & Wasserstein, 1998). However, Anderson (2005) contends that social science and disaster research on children has lagged due to their status in society. In this Anderson (2005) refers to the fact that children are not the ones setting the agenda, carrying out the research nor are they in policy making or relevant professional positions, where they can be champions within DRR. Therefore, in the past others have had to champion their cause to get desired results (La Greca et al., 2002; Anderson, 2005).

Although we often refer to children as one of the 'vulnerable' groups when disaster strikes, this does not mean they are just passive victims in the face of disaster (Peek, 2008; Anderson, 2005; UNISDR, 2015). In fact, a person's vulnerability to a disaster is reflective of their pre-existing conditions within society prior to the hazardous event (Gaillard, 2010; Wisner, 1993). As Martin (2010) points out there is a tendency for humanitarian workers to perceive children and their communities as helpless victims in need of outsider assistance. However, children are not dependent observers of the scene, they hold their own strengths and unique views about their community and environment (Delicado et al., 2017). An example of this was captured by the Disaster Research Centre [DRC] following the 1964 Alaska earthquake where in the fishing village of Ouzinki, Anchorage several indigenous youths were sitting at the dock immediately after the earthquake. One of the boys had been in Japan during a tsunami and when the bay began to churn, he sensed what was about to happen. The boy decided to take one of the fishing boats out to deeper waters and radioed back to the others to reassure them the water was calm. He encouraged other youths to bring the boats from the shallows out to sea. The boys towed the boats away from the danger area and kept the vessels safe in an all-night expedition (Norton & Haas, 1970). The story of the indigenous youths following the Alaska earthquake, provides a glimpse into capacities of children and youth during a disaster, and their ability to be credible and valuable participants within DRR.

Since the 1989 United Nations Convention of the Rights of the Child [CRC], enhancing children's participation and decision-making in society has gained considerable momentum (Aldridge, 2015). In Alderson's (1995) report *Listening to Children* she claims that up until the mid-1990s the views of children and young people had at large been overlooked in research. In Brown's study, conducted in 1998 (as cited in Aldridge, 2015) similar observations are made, claiming that one of the main reason's children are vulnerable and have remained marginalised within our societies for so long is due to their absent voice in public discussions. We now know from the growing literature that children hold unique and valuable knowledge about their community and on disaster risks (World Vision, 2009; Martin, 2010; Aldridge, 2015; Gaillard et al., 2010). Listening to their views as the UNISDR says is an "opportunity we can't afford to miss" (UNISDR, 2012 p. 7), if we wish to build more resilient communities' in the face of disaster (World Vision, 2009; Martin, 2010; Aldridge, 2015; Gaillard et al., 2010). Despite positive, evidence around child-centred DRR approaches several authors argue that child-centred approaches are frequently driven by an adult agenda (Mitchell et al., 2009; Martin, 2010; Aldridge, 2015; Gaventa & Cornwall, 2006), this in turn influencing the knowledge produced. Within

DRR, participatory initiatives have become a tool to capture a diverse range of local knowledge and provide a platform that enables more vulnerable groups (e.g., children, elderly and ethnic minorities) to be heard by stakeholders outside of local communities (e.g., scientists, decision-makers, etc.) (Goodchild, 2007).

Participatory methods to DRR are a valuable approach because they enable 'insider' (e.g., children) groups to communicate their priorities and allow local knowledge to influence the decision-making process (Twigg, 2004). In adopting such an approach, participatory research claims to empower communities within DRR. However, participatory methods must be embarked on with caution. As Gaventa & Cornwall (2006) argue that participation without a change in power relations can sometimes result in a more 'democratic' face to the status quo. Thus, the emphasis with participatory methods should not be on the production of knowledge for the sake of producing knowledge, but rather knowledge that will lead to practical solutions to problems (Gaventa & Cornwall, 2006). Participatory methods within the context of DRR include mapping, ranking, transect walks, focus groups, seasonal timelines and Venn diagrams (World Vision, 2013). Participatory methods aim to empower the powerless and create change at policy, institutional and personal levels, and generate sustainable solutions that fit with local communities' priorities and socio-cultural context (Gaillard et al., 2015). Child participation in DRR is still considered a relatively new concept that is not always encouraged by parents, communities and organisations (Martin, 2010). Martin (2010) points out that this is due to a perception that children are unable to raise the wider communities' concerns, nor should they be expected to. However, without children's input in DRR research and planning this can have adverse consequences on how children are perceived and treated within society (Mitchell et al., 2009; Aldridge, 2015).

Aldridge (2015) emphasises that the methods and mechanisms used to engage children in participatory approaches are critical in fostering genuine participation. For this reason, tools have been developed specifically for educating and involving children in DRR; comics, cartoons, board games, card games, role play and now participatory mapping (Gaillard et al., 2010). However, many of these tools used to engage children in DRR do not provide a credible platform for their ideas and knowledge to be communicated in a legitimate way (Gaillard et al., 2010; Aldridge, 2015). Participatory mapping is a participatory method using a map-making process that attempts to make visible the association between land and local communities by using the commonly understood and credible language of cartography (International Fund for Agricultural Development [IFAD], 2009). Chambers (2008) points out that participatory mapping can be utilized as a powerful tool within DRR as maps can clearly illustrate perceived realities within local communities. Participatory maps enable local communities, assisted by 'outsider' groups, to paint a picture of their territory, perceived natural hazards as well as their capacities and vulnerabilities (Gaillard et al., 2015; Twigg, 2004). However, it is crucial that maps are intelligible, and dialogue is encouraged between all stakeholders involved (Gaillard et al., 2015).

A tool that has recently been identified for its potential in fostering dialogue and participation amongst stakeholders is participatory 3-dimensional mapping [P3DM] (Gaillard et al., 2013). Rambaldi (2010) defines P3DM as a participatory mapping method "based on extracting topographic information (i.e. contour lines) from scale maps, and then constructing a physical model that is used to locate peoples' spatial memories." (p. 3). Figure 1.1 below depicts a local community working on their three-dimensional map, as an example of P3DM.

Figure 1.1. Example of three-dimensional model. Reprinted from *Participatory Three-dimensional Modelling: Guiding Principles and Applications* (p3), by G. Rambaldi, 2010, Wageningen, Netherlands. CTA. Copyright (2010) by Giacomo Rambaldi. Reprinted with permission.

P3DM emerged in the early 1990s in the Philippines and Thailand as a tool to facilitate land conflict resolution and natural resource management, amongst ethnic minority groups (Gaillard et al., 2013). These maps created have been recognised for their contribution in raising local awareness of the landscape and as an effective community organisational tool (Rambaldi et al., 2002). This form of P3DM has spread throughout the globe with numerous experiences in Asia, Latin America and Africa, as documented in the Integrated Approaches to Participatory Development (IAPAD) website. The process of building a 3D model of a community not only provides a tangible view of one's environment but a unique collective learning experience (Rambaldi, 2010). In other words, it takes a step beyond the two-dimnesional and sometimes abstract dialogue that can occur in DRR planning but provides a visual representation of knowledge (Rambaldi, 2010). However, to date little has been done with children and P3DM in the context of DRR. The small amount of participatory mapping that has taken place with children has predominantly been conducted in developing nations. The lack of focus and tools available to harness children's participation in DRR, within Western cultures was the driving catalyst to this research. Which lead to this research hypothesis: can LEGO be used as an effective P3DM tool to foster children's participation in DRR planning and management?

Chambers (2007) contends that like any participatory tool used, the success and failure in implementing P3DM projects depends upon the process of participation. Participation in its simplest form is "the action of taking part in something" and should be a voluntary process which people can influence the decisions that affect them (Saxena, 1998). However, as Cornwall (2008) highlights that participation is now often seen as an outcome by many agencies and it is important that 'participation' is not reframed to meet the demands of the 'outsider' but meet the needs of the community. Therefore, in order to foster genuine participation, it is crucial that the tools used to engage and foster dialogue between stakeholders is first and foremost appropriate and relatable to the communities' context. Secondly the tools must create constructive and interactive dialogue among stakeholders, as

this has been identified repeatedly in the literature as being a major hinderance to sustainable DRR (Gaillard, 2010; Mercer, Kelman, Taranis & Suchet-Pearson, 2009).

1.2 *Rationale behind LEGO:*

The name LEGO was derived from the Danish words 'Leg Godt' which means to 'play well'. The LEGO Group was founded in 1932 in Billund, Denmark by Ole Kirk Kristiansen (LEGO Group, 2018). This family-owned company has evolved into one of the world's leading manufacturers of play materials (LEGO Group, 2018). In 2014, the LEGO Group was named the biggest toymaker in the world (CNN, 2014). The LEGO brand is not only popular with children, but people of all ages. The LEGO Group is undoubtedly best known for its interlocking plastic bricks that allows over 915 million combinations with a 2 x 4 stud brick, to allow children and adults to build as their imagination sees fit. The LEGO Group has built a brand that is now a ubiquitous symbol of childhood within Western cultures, with LEGO movies, cartoons, LEGO league and LEGO mind storms. The ethos of the LEGO Group is to empower children to become creative, engaged and life-long learners (LEGO Group, 2018). From the LEGO Group the LEGO Foundation emerged in 1986 with an aim to work with parents, carers, schools, institutions and governments to promote play and quality childhood education with sustainable change (LEGO Foundation, 2015). The LEGO Foundation has started to have a presence within the context of DRR, partnering with organisations such as Save the Children, UNICEF and the Red Cross to provide play experiences and toys following a disaster (LEGO Foundation, 2015). The LEGO Foundation also has the Research Centre for Creativity, Play and Learning which is primarily interested in understanding the role of play in creating more resilient communities (LEGO Foundation, 2015). However, to date no research has ever investigated whether the LEGO brick could be used as a P3DM tool to enhance children's participation in the field of DRR.

To date P3DM using LEGO is a novel and innovative idea that has never been done before. The LEGO brick has the potential to plot and map a variety of information about local territory, foster learning and raise awareness in a playful and engaging manner appropriate for children. Not only is P3DM using LEGO a tool that is appropriate for children, but it also holds the potential to create dialogue that is both constructive and integrative between a variety of stakeholders. P3DM with LEGO has the potential to enable children to build or re-create specific real-life places or objects in a three-dimensional format using the interlocking LEGO plastic brick. This presents an opportunity to close the gap between 'insider' (children) groups and 'outsider' (DRR practitioner) groups within the DRR paradigm, specifically in a Western child's world. It is anticipated that further research in this area will advance the agenda of involving children in DRR research and initiatives. As children represent a significant proportion of those affected by natural-hazards, it is pertinent that their knowledge and capacities are heard.

1.3 *Research question and objectives:*

The research question for this study is:

"Can participatory mapping, using LEGO, effectively engage children in disaster risk reduction?" This research question will be achieved through three objectives:

1. To assess the strengths and limitations of LEGO, as a participatory mapping tool, with children.
2. To evaluate the role of LEGO, in producing children's knowledge about disaster risk within their community.
3. To determine the best practice of using LEGO to increase children's participation in disaster risk reduction activities.

1.4 *Research Setting:*

The setting of this research took place in Maraekakaho, Hawke's Bay. Maraekakaho primary school, is situated in the Hawkes Bay (Figure 1.2). Maraekakaho primary school is a decile 8 co-educational state full primary school. It is located 21.5 kilometres west of Hastings in a rural farming and wine-growing region. The population of Maraekakaho is 1,425 (Stats NZ, 2013). The school currently caters for 150 year 1-8 students. The students come from a wide range of socio-economic groups, with approximately 20% of pupils identifying as Maori.

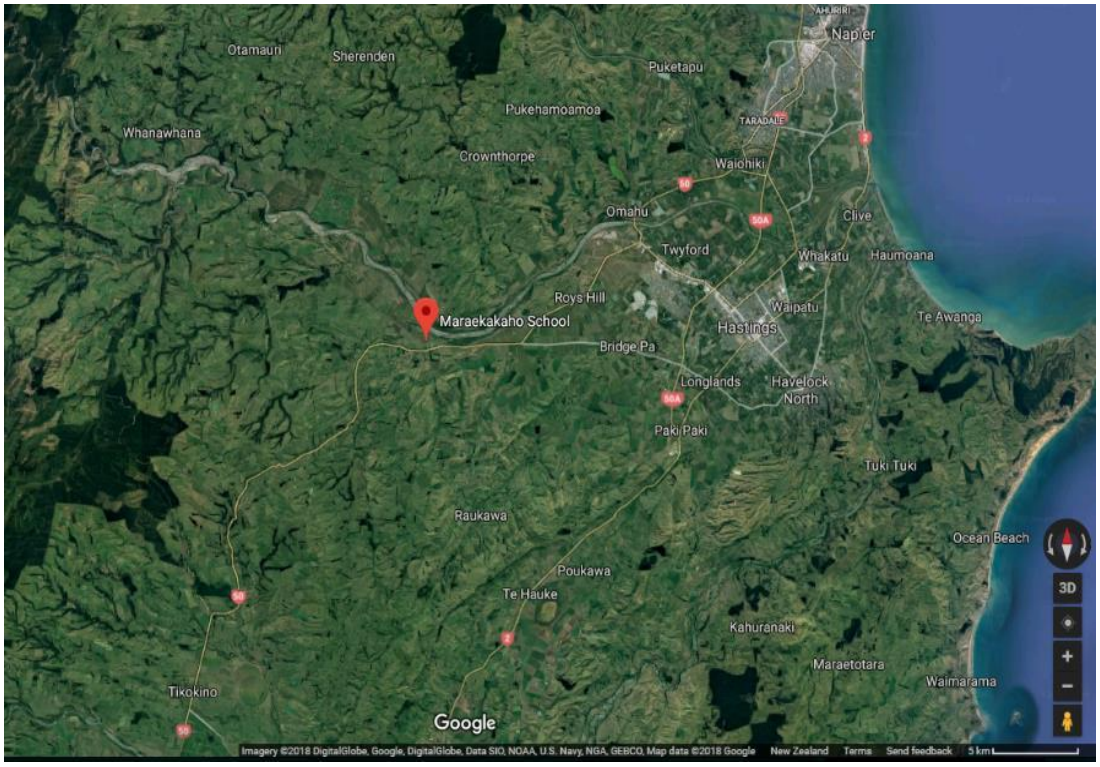

Figure 1.2. Maraekakaho Study Site. (2018). Retrieved from *Googlemap.com.*

Hawke's Bay is exposed to a wide range of natural hazards (e.g., tsunami, earthquakes, flooding, bush fires etc). In 1931 Hawke's Bay experienced an earthquake that killed 256 people, still to this date it remains the biggest disaster in New Zealand in terms of mortality. The majority of people in Hawke's Bay live on flood plains where, despite extensive flood control works, flooding is still a significant risk (ECL, 2018). Landslides also pose as an on-going risk to transportation links, property and long-term economic productivity. Coastal areas also require greater controls on development to minimise people's exposure to storms, flooding and erosion as well as rising sea levels. The effects of climate change mean an increased variability in events over a shorter time – resulting in more extreme weather patterns.

The population of Hawke's Bay is 161,780 (MOH, 2016), with an estimated 45,136 people under the age of 19 years living within the wider Hawkes Bay region. Will the population in Hawke's Bay tends to be older than the national average, children (as defined by the Convention of the Rights Child) still make up 27.9% of the total population (MOH, 2016). These figures are estimated to increase by 2% over the next decade (MOH, 2016). While Hawke's Bay is a region on the east coast of New Zealand, known for its beaches, wineries and bustling tourism industry it is a region within New Zealand with gaping inequities. It is estimated that 52% of the Hawke's Bay population is living in the most deprived areas (MOH, 2016), while 15% of the region's population lives in the least deprived areas. Hawke's

Bay has proportionally more people in the most deprived sections of the population, than the New Zealand national average (MoH, 2016). The Hawke's Bay region is not only vulnerable to natural hazards due to its geographical setting, it is a population with complex needs, making the need for sustainable DRR planning and management even more important.

1.5 *Significance of this Study:*

This research fits within a wider project named 'Participation and technology in citizen science for strengthening resilience to natural hazards (P-TECH in CITSCI)', that is being funded by the New Zealand Ministry of Business, Innovation and Employment [MBIE]. The wider project aims to pilot the use of participatory mapping with the use of drones, video game and LEGO sets in fostering citizens' participation in enhancing resilience to natural hazards in Hawke's Bay. This project has been done in collaboration with local practitioners such as East Coast LAB and Hawke's Bay Regional Civil Defence Emergency Management group [CDEM].

Gaventa (2006) states that participation has become a buzz word in disasters and social science research, that is often used as reporting or outcome measurement. The danger of this is that participation without a real shift in power relations, may simply place a more 'democratic' face to the status quo (Gaventa, 2006). However, if the right tools and processes are in place to enable genuine participation, then sustainable solutions should arise (Martin, 2010). Although children are vulnerable to disasters, they are not passive victims. They hold unique and valuable knowledge about their environment and there is still much to learn about their various capacities (World Vision, 2009; Martin, 2010; Aldridge, 2015; Gaillard et al., 2010). However, there is still limited research into the role children can play as communicators and participants of DRR, as well as limited tools that foster genuine participation. This research project will assess the use of LEGO as a P3DM tool to advance the agenda of children's participation in DRR.

1.6 *Thesis Outline:*

The overall structure of this thesis takes the form of six chapters and is organised in the following way:

Chapter two, *literature review,* serves as the primary means of critically examining the literature around children in DRR and participatory methods and approaches. This chapter reviews and evaluates the gradual evolution of DRR literature. This chapter reiterates how the discourse surrounding children has predominantly focused on children's vulnerabilities and the effects on children in a post-disaster context. Participation is discussed and the participatory methods that emerged to empower those vulnerable groups within our societies. Despite the widely accepted notion that participation is morally correct, child participation still seems to the be the subject of much strongly divergent opinion (Hart, 1992; Martin, 2010). As a result, child participatory research has lagged, and our understanding of children's capacities and ability to conduct risk assessment in DRR is incomplete. To address this knowledge, gap the concept of participation, play and knowledge are merged together to develop a framework for children's participation in DRR. It is concluded in this chapter that while, children's participation is indeed complex there are several opportunities to improve our understanding of their knowledge and capacity to contribute to DRR.

Chapter three, *methodology and method,* this chapter is split into two main sections. The first section of this chapter will describe the chosen research methodology which is participatory ethnography. Participatory ethnography combines two methodological approaches in order to enable participants to tell their own story as well as find their own solutions that will benefit their community directly (Chambers, 1995; Gaventa & Cornwall, 2006; Aldridge, 2015). This methodology strives to build on the

momentum around the world, where new opportunities are arising for children and communities to engage in research, policy and decision making (Gaventa, 2006). A critical component highlighted in this chapter is the co-designing of the methods used in this thesis to produce the research findings and knowledge. A combination of participatory tools are explained in this chapter, alongside the objective each tool played in building trust and rapport with the students. However, the primary participatory tool used and explained in this chapter is three-dimensional LEGO mapping.

Chapter four, *results,* this chapter serves to outline the findings from the field work. In order to answer the research, question the following research objectives were investigated: (1). assess the strengths and limitations of LEGO, as a participatory mapping tool, with children (2). evaluate the role of LEGO, in producing children's knowledge about disaster risk within their community (3). determine the best practice of using LEGO to increase children's participation in DRR activities. In the first section of this chapter the preliminary considerations of the research findings are identified. Section two begins to describe what was found in regards to the strengths and limitation of LEGO mapping both from the perspective of the students and researcher. Following this the capacities and implications of LEGO mapping as a tool to produce children's knowledge in DRR are outlined alongside the barriers that face both the tool and children's participation. This chapter lays out the empirical findings found from LEGO mapping with children, the benefits and future areas of discussion.

Chapter five, *discussion,* the purpose of this chapter is to discuss the research findings and how they contribute to the wider body of evidence. During a time where inclusion, participation, empowerment and collaboration have emerged as buzz words within research and policy it is here that the challenges of child-participation are teased out. As Chambers (1995) highlights that we continue to neglect the role of "us" the powerful in the equation of inequity and vulnerability. In order to unpack the research findings this chapter places a spotlight on the wider body of evidence and how the findings either address or come up short in relation to the challenges of child-participation. This chapter strives to place the role of "us" in the analysis of child participation and how LEGO mapping and the lessons learnt from this thesis can harness child participation within DRR.

Chapter six, *concluding thoughts and future research,* and final chapter. This chapter re-examines the catalyst which provided this research question, which is that our understanding of children's capacities within DRR is incomplete and we need to continue to find new ways of harnessing children's participation. Following this the chapter will reflect on the entire research journey and summarise the key findings from this thesis. This research hypothesised that LEGO mapping could address many of the challenges faced around children's participation in the field of DRR. This chapter highlights the contribution and potential capabilities of LEGO mapping moving forward and makes recommendations for future research in this field. This chapter concludes that in order to pursue the child participatory agenda in the field of DRR we need to continue to include them not only in our future research but in our decision making. However, in order to do that it is pertinent that the adults, caregivers, DRR practitioners, policy makers and wider community members learn to trust children's ability to contribute to DRR in a meaningful way.

Chapter Two: Literature Review

2.0 *Introduction:*

Disaster risk is the potential loss expressed in assets, lives and health status, which could occur to a society due to the impact of a hazardous event (UNISDR, 2017). DRR is the systematic approach of reducing disaster risk, by minimising society's vulnerabilities to prevent or limit the impact of hazards (UNICEF, 2010; Twigg, 2004; CRED, 2016). Children are disproportionately affected by disasters each year (Kearney, 2015; Save the Children, 2014; UNICEF, 2014). Therefore, in DRR literature and policy they are often referred to and thought of as vulnerable victims of disasters (Kearney, 2015; Wisner et al., 2018). Yet children also hold their own unique perspectives about their environment and have their own social network which is often dismissed or not recognised as a capacity within communities (Peek, 2008). The concept of capacity is important in the field of DRR, as it recognises that people and community members play a pivotal role in sustainable DRR strategies. Capacities in DRR are the resources such as local knowledge, networks and skills people possess to cope and recover from disasters (Gaillard, 2010; Davis, Haghebeart & Peppiatt, 2004). Participatory approaches to DRR have become increasingly popular as a method to empower the powerless and provide opportunities for minority groups (e.g., children, women, indigenous peoples) to participate and communicate their knowledge and priorities in order to influence the decision-making process (Twigg, 2004). However, participation is an intricate and overwhelmingly complex process. The complexity of child participation is seemly more complex which is not exclusive to the field of DRR but is a concept that conflicts with many deep-rooted cultural norms and political ideologies.

Despite the widely accepted notion that participation and children's participation are 'morally correct' (Cooke & Kothari, 2001), it is still something as a global society we struggle to put into practice. The purpose of this chapter is to critically review the current literature around children in DRR. This chapter has therefore been organised into six main sections. Section one, will critically examine the evolution and key concepts within DRR. It will review the dominant approaches which shaped DRR in the past as well as the root causes of disaster. Section two, will review the literature on children in DRR: specifically, through the lens of children's vulnerabilities and capacities. The third section will examine the literature on participation and child participation in DRR, and the various theories and strategies used to include children in DRR. Section four will focus on participatory methods, specifically within DRR to then identify gaps, strengths and limitations of these methods. Finally, section five will summarise the key points from this chapter in the conclusion and present the areas of opportunity moving forward for children's participation in DRR.

2.1 *The Evolution of Disaster Risk Reduction: Historical Context*

Disasters are hazardous events that cause serious disruption to the function of a community or society (UNISDR, 2017). Hazardous events can either be man-made (industrial accidents, political unrest, military conflict etc.) or natural (earthquakes, volcanic eruptions, typhoons or tsunamis) (Martin, 2010). The Centre for Research on the Epidemiology of Disasters [CRED] recently released a report on mortality trends from major disasters from 1996-2015. In this report it is found that from 1996-2015 there were a total of 7,056 disasters recorded worldwide by the Emergency Events Database [EM-DAT] (CRED, 2016). During this time there was a continual rise in climate and weather-related events such as floods, storms, droughts and heatwaves (CRED, 2016). Climate and weather-related events accounted for most deaths and the mortality rate for climate related disasters has more than doubled over the past forty years (CRED, 2016).

Disaster research has historically been considered from a geophysical science perspective, with a focus on methods to understand, monitor and predict natural events to reduce their impact on humans (Gaillard, 2010). For a long time, experts such as meteorologists, seismologists and volcanologists have perceived natural hazards as the cause of disasters (Heijmans, 2009). This earlier hazard paradigm has been termed the *dominant hazard-focused viewpoint* (Hewitt, 1983). This approach has traditionally been technocratic, based on the transfer of experts' (scientists, researchers and engineers) knowledge towards local communities (Gaillard, 2010). Many academics argue that the modern age of social science disaster research begun with Samuel Prince's (1920) study on the 1917 Halifax, shipping explosion (White & Haas, 1975; Mileti, 1999; Anderson, 2005). Since Prince's (1920) study the dimension of the human impact in disaster, has made much progress. However, since the 1970s, the much-heated debate which surrounds the social dimension of disasters escalated following O'Keefe, Westgate & Wisners (1976) "Taking the naturalness out of natural disasters" article. In their article they observed that the greatest loss of life per disaster was repeatedly in developing nations. It is here that O'Keefe et al., (1976) start to view disasters as the collision of extreme physical phenomenon with a vulnerable human population (Heijmans, 2009). 'Vulnerability' in disaster literature stresses upon the pre-existing conditions of a society which make it possible for a hazard to disrupt it and become a disaster (Cannon, 1994: p.13). As Martin (2010) states that different societies can be exposed to the same event with completely different outcomes. This is due to the combination of hazards and vulnerabilities or inequities that exist within those societies.

Following O'Keefe, Westgate & Wisners (1976) "Taking the naturalness out of natural disasters" article, the vulnerability paradigm has evolved and been interpreted in several different ways. In its earliest interpretation vulnerability refers to the conditions which lead people to be fragile in the face of hazards (O'Keefe et al., 1976; Sen, 1983; Wisner, 2006; Gaillard, 2010). Thus, emphasising that disasters are in fact political in their origin, with some arguing that the term natural be replaced by "social or political disasters" (Richards, 1975). The hazardous event rather interacts with conditions of exposure, vulnerability and capacity leading to loss or impact in one or more of the following areas: human, material, economic and environmental, in turn causing a serious disruption to the function of a society (UNISDR, 2017). Hazards are exacerbated by poverty, poor risk governance, a lack of early warning systems and an individuals' specific vulnerabilities (e.g., age, socio-economic status or disability) (CRED, 2016). It is often those marginalised groups within society who are at greatest risk of the effects of hazards, due to their existing vulnerability prior to a disaster. Vulnerability, as a result of societal inequities, is therefore at the core of all disasters (O'Keefe et al., 1976; Hewitt, 1983; Watts & Bohle, 1993; Martin, 2010).

Wisner (2006) notes that since the 1970s there has been a surge in research regarding the social dimension of disaster as well as local communities' resourcefulness (e.g., knowledge, skills) in the face of disaster. Concepts such as 'vulnerability', 'capacity' and 'resilience' have emerged influencing the ways in which DRR is implemented in our communities (Wisner, 2006; Mitchell et al., 2009; Gaillard, 2010). In this era development approaches to DRR started to focus, or at the very least discuss how the impact of natural hazards can be reduced by building resilience and capacity within communities, rather than just focusing on a community's vulnerability (Gaillard, 2010; Mitchell et al., 2009; Wisner, 2006).

'Resilience' emerged in the 1970s in ecological literature and gained considerable momentum in the 1990s in DRR research (Torry, 1979; Gaillard, 2010; Manyena, 2006). Resilience in the field of DRR refers to the ability of a community to adapt and cope with hazards (Gaillard, 2010). While 'capacity' emerged in DRR from practitioners in the late 1980s (Anderson & Woodrow, 1989; Gaillard, 2010). Capacities are the resources and assets that people possess to cope and recover from hazards (Twigg,

2004; Gaillard, Cadag, & Rampengan, 2018). It is important to note that capacities and vulnerabilities do not sit at opposite ends on a single continuum, just because someone is vulnerable it does not mean they do not have their own capacities (Gaillard, 2010; Gaillard et al., 2018). To date, DRR initiatives that have endeavoured to foster community resilience and strengthen community capacity have predominantly targeted an adult audience. When children are discussed in DRR they are still considered as passive, weak and vulnerable victims in disasters. This approach assumes that children's voices are not valuable in DRR, nor do they have the capacity to communicate meaningful information (Anderson, 2005).

There are roughly 2.3 billion children globally, and over half a billion of them live in high flood occurrence zones and 160 million children live in drought or high drought zones (UNICEF, 2016). While better data is needed on overall disaster mortality, particularly in relation to age and ethnicity groups in low and lower-middle income countries, experience and research has shown that the most vulnerable groups are disproportionately affected, including children, elderly, women, indigenous, people living with disabilities and the most impoverished (UNCIEF, 2016; CRED, 2016). In this way, inequity plays a significant role in moulding people's vulnerability to disasters. For instance, if children do not have the same access to early warning information as adults, then this increases their vulnerability. If children are not able to influence or act on decisions that shape their lives, such as the choice to stay in school, evacuate in advance or move to a safer location, then this will increase their vulnerability. In this regard Peek (2008) contends that when children are vulnerable, our entire community is vulnerable. Therefore, including children in DRR is pertinent in developing sustainable and holistic solutions to DRR.

2.2 What has been said about children within Disaster Risk Reduction?

The Convention of the Rights of the Child [CRC], defines a 'child' as anyone under the age of 18 years (UNICEF, 1989). Therefore, it must first be acknowledged that children do not constitute a homogenous group. Children come in different ages, gender, ethnicity, religion and have different needs (Delicado et al., 2017). For example, a child living with a disability will require different needs in the face of a disaster compared to a child without a disability (Delicado et a., 2017; Peek, 2008; Ronoh et al., 2015). Over the last two decades, there has been an increasing body of literature devoted to children and DRR. However, most of the research on children has focused on their vulnerabilities and children's trauma in a post-disaster context (Peek, 2008; Ronoh et al., 2015; Wisner et al., 2018; Wachtendorf et al., 2008). Table 1 outlines the three main areas in which children are discussed in social science disaster research. From the Table below, it becomes apparent that there are several overlaps and reoccurring themes in the literature, with a strong focus on a child's micro and macro environment influencing their vulnerability.

Table 1.

Factors influencing children's vulnerabilities in disaster

Psychological Vulnerability	Physical Vulnerability	Educational Vulnerability
• Trauma from a threat to their life, family members or primary guardians • Separation from family members or social support networks due to displacement	• Poor living conditions prior to exposure of hazard resulting in increased risk of: injury, illness, disease or malnutrition	• Substandard school buildings, resulting in damaged school infrastructure • Missed school • Poor school performance • Delayed progress

• Interference with daily routine due to damage to school and community infrastructure • Displacement due to material loss and damage to home • Characteristic of child: age, gender, socioeconomic status [SES], religion. • Exposure to the hazard	• Characteristics of child: age, stage of development and SES. • Loss of parents, primary caregivers or social support networks. • Increase of communicable diseases such as vector borne diseases due to flooding • Geographical location of home	• Characteristics of child: age, stage of development and SES.

Note. Source Adapted from Peek (2008, p.10).

Table 1 highlights the common rhetoric which surrounds children in DRR which are the various ways in which they are vulnerable and weak (Wisner et al., 2018; Peek, 2008, Anderson, 2005). The research suggests that a child's response and vulnerability during a disaster event is largely influenced by their demographic and family network (Vogel & Vernberg., 1993; Wachtendorf et al., 2008). According to Peek (2008) infants and young children are particularly vulnerable to disasters due to their partial or total dependence on adults. In this context, children face a range of physical vulnerabilities, from death, injury and disease related to malnutrition or poor water sanitation (Greca et al., 2002; Peek, 2008; Norris et al., 2002; UNICEF, 2016; Tsujii et al., 2017). Disasters in turn can affect children's personal growth and development, as the spaces and places in which children live, learn and play are harmed (Martin, 2010; Peek, 2008; UNICEF, 2016). Displacement and separation from guardians and support networks can increase a child's impoverishment, in some instances exposing children to abuse, exploitation and trafficking (UNICEF, 2016). Depending on the age, level of social and cognitive development, ethnicity, gender and socio-economic status of a child, their level of vulnerability when exposed to hazardous events will vary, much like that of an adult. It is widely known and acknowledged that children are vulnerable in the face of a disaster, yet just because someone is vulnerable in one area of their life it does not mean they do not possess capacities in other areas of their life (Gaillard et al., 2010). However, very little research exists about children's capacity to produce knowledge, conduct risk assessments and be their own agents of change (Anderson, 2005).

Many children do rely on the adults in their lives for support and protection, which is often highlighted as one of their vulnerabilities (Peek, 2008; Wisner, 2006; Wachtendorf et al., 2008). However, capacities and vulnerabilities do not sit at opposite ends on a single continuum (Gaillard, 2010). Being a child, particularly of school age (5-18 years) is a unique time in a person's life. This being that a school-aged child is connected to a large social and support system via their school community (Wachtendorf et al., 2008). Much of their week and time is dedicated to a learning environment, surrounded by peers from an array of households within the community (Wachtendorf et al., 2008; Peek, 2008; Anderson, 2005). The location of children in schools, means they have the potential to disseminate disaster mitigation and preparedness information to a large proportion of a community (Peek, 2008). Children of immigrant or refugee families can also play a significant role as the family or household interpreter (Ensor, 2008). Therefore, they could potentially play a critical role in disseminating DRR messages within vulnerable groups (Ensor, 2008; Wisner, 2006). Children also have an abundance of energy, creativity and enthusiasm which most adults have lost, which can be utilized prior and during a disaster. Table 2 below outlines the various capacities and potential that children possess.

Table 2.

Children's capacities in preparing, responding and recovering from a disaster

Preparedness	Response	Recovery
• Communicators of risk and preparedness to households • Creative ideas and perceptions of disaster planning and preparedness • Disaster drills and evacuation • Mapping and plotting community risks • Mapping and plotting evacuation plans • Conducting risk assessment	• Communicators of risk • Warning others within the wider community and households • They hold knowledge of other community members households (e.g., how many people live there, number of siblings etc) • Evacuation assistance • Search and rescue	• Assisting with household and family chores following a disaster • Peer support groups and counselling • Help with the planning and designing of building and community spaces • Creative ideas for coping strategies such as writing, drawing, art work and music. • Communicators of community notices around disaster recovery

Note. Source Adapted from Peek (2008, p.18); Wachtendorf et al. (2008) & Anderson (2005).

Our understanding of the various capacities and potential children possess is indeed incomplete (Anderson, 2005; Martin, 2010; Pfefferbaum et al., 2014 & Wisner et al., 2018). Most of the literature so far has focused heavily on children's trauma, symptoms and vulnerabilities either during or in the wake of a disaster and dismissed their capacities and strengths when faced with adversity (Martin, 2010; Peek, 2008; Anderson, 2005; Pfefferbaum et al., 2014 & Wisner et al., 2018). However, this is not exclusive to the field of disaster with some authors arguing that children have remained vulnerable due to their absent voice in public discourse (Brown, 1998; Alderson, 1995, Gibbs et al., 2013). This idea of the absent voice shifted the focus where researchers and practitioners started to think about ways to include and provide a platform for those without a voice (Gibbs et al., 2013; Lopez et al., 2012; Delicado et al., 2017). Some academics and practitioners argue that providing a space for children and youth to be included in discussions and the decision-making process will provide a more complete understanding of children's capacities within the field of DRR (Anderson, 2005).

2.3 *Different Forms of Participation*

Participatory approaches to foster DRR have become increasingly recognised as a valuable approach because they enable 'insider' groups to communicate their priorities and allow local knowledge to influence the decision-making process (Twigg, 2004). Participatory approaches emerged as an alternative to the dominant 'top-down' approach for example extractive questionnaires or surveys (Cornwall, 2011; Le De., Gaillard., & Friesen, 2014). In adopting such an approach, participatory research claims to empower communities to have their voice heard, and recognises the legitimacy of local knowledge (Freire, 1970). Participatory approaches strive to contribute to change at policy, institutional and at a personal level. In turn generating sustainable solutions that fit with local communities' priorities and socio-cultural context (Gaillard et al., 2015).

Participation at its simplest form is defined as the "action of taking part in something" (Oxford Dictionary, 2018). Participation in practice is seemingly more complicated and manifests itself in many ways. For this reason, participation as a practice can at times be interpreted differently by a variety of stakeholders and has taken on several definitions (Bhattacharryya, 2004). In Sherry Arnstein's *Ladder of Citizen Participation* (1969) article, she argues that while everyone seems to agree that participation is good, it is not always embraced and has forever been surrounded by much heated controversy. There is also a critical difference between participation as an empty outcome for the sake of bureaucratic purposes and participation as a process by where the real power is handed over (Arnstein, 1969; Hart, 1992; Pretty, 1996 & Gaventa, 2006). Cohen and Uphoff (1977) stress this idea and define participation as a process that actively involves people in the decision-making process. At its core participation challenges deep-rooted and historical power inequities and as a result several hierarchical theories have emerged to better understand the different forms in which participation takes place (Cornwall & Gaventa, 2006; Arnstein, 1969; Hart, 1992; Pretty, 1996). A founding theory of participation is Arnstein's (1969) ladder of citizen participation (below in Table 3).

Table 3.

Ladder of Citizen Participation.

8. Citizen Control	**Citizen Control**
7. Delegation	
6. Partnership	
5. Placation	**Tokenism**
4. Consultation	
3. Informing	
2. Therapy	**Non-participation**
1.Manipulation	

Note. Retrieved from "A Ladder of Citizen Participation", by S. Arnstein. 1969, *JAIP, 35*(4), p. 218.

The ladder above illustrates the different forms of participation which fit within three main categories: nonparticipation, tokenism and citizen control. In this theory participation is linked closely to power, and the significant gradations of citizen participation (Arnstein, 1969). Arnstein argues that participation without a redistribution of power is an empty exercise. While Arnstein's ladder of participation remains relevant, academics have continued to revisit and build upon this theory. One of these adaptations is Pretty's (1995) typology of participation. Pretty expands on how participation appears from the participants perspective and focuses on self-mobilisation rather than the distribution of power (illustrated below in Table 4).

Table 4.

The different types of participation

Typology of participation	Features of participation
Manipulative Participation	Participation as a 'token' pretence with no legitimacy or power been given to the chosen representative.
Passive Participation	People are informed of the decisions that have been made and no genuine opportunity is given to provide feedback or respond to these decisions.
Participation by Consultation	People are given an opportunity to participate to decision making through consultations, surveys or questionnaires.
Participation for Material Incentives	People participate by an exchange of resources for example they contribute their ideas or time in exchanges for cash vouchers, food or other material goods.
Functional participation	External stakeholders encourage participation in order to meet project goals or objectives.
Interactive participation	People participate alongside to develop plans and projects to strengthen community institutions.
Self-mobilisation	Community initiated and led, which is completely independent of 'outsiders'.

Note. Adapted from "The many interpretations of participation", by J. Pretty. 1995, *In Focus, 16*, p. 4.

What becomes clear from both these theories is that participation is closely linked to power and the intention of participation in the first instance. As Freire (1970) puts it, participation needs to be about local people taking control over the determinants that affect their lives. However, as shown above participation moves along a continuum, which at large is influenced by those who hold the power. In theory DRR should recognise an array of stakeholders and their distinct roles in enhancing disaster preparedness (UNISDR, 2015; Gaillard et al., 2015). However, in practice there remains a significant gap between those 'insiders' who are immediately at risk (e.g., local governments, communities and schools) and those who sit on the 'outside' (e.g., scientists, international organisations and national governments).

2.3.1 Analysing child participation:

Prior to the signing of the CRC, in 1989, much of the discourse surrounding children in DRR was a 'children at risk' agenda (Delicado et al., 2017; Gibbs et al., 2013). Up until the mid-1990s children were discussed in terms of their helplessness (Alderson, 1995; Brown, 1998; Delicado, 2017). Concerns about their risks and vulnerabilities perpetuated a global discussion (Gill, 2007; MacDougall, 2009). In Alderson's (1995) report *Listening to Children* she argues that the views of children have largely been overlooked, and these findings are not just exclusive to research but at a societal level. Similar observations were made in Brown's (1998) study into *Understanding Youth and Crime* where the author proposes that children have remained vulnerable within our societies for so long due to their absent voice in public discourse. Following the CRC there was a movement in the 1990s towards what

we can learn from children. The paradigm started to shift from one of 'children at risk' towards a paradigm of 'child participation' (Gibbs et al., 2013; Lopez et al., 2012; Delicado et al., 2017).

Since the 1989 CRC, enhancing children's participation and decision-making has slowly gained momentum (Aldridge, 2015). Under the CRC, particularly in relation to Article 12 it states "children have the right to participate in all matters which affect them" (UNCRC, 1989, p. 5). Children's participation, dialogue and knowledge in DRR is consistent with the CRC, which was adopted and endorsed by the UN General Assembly. In Article 13 it goes on further to argue that "the child shall have the right to freedom of expression; this right shall include freedom to seek, receive and impart information and ideas of all kinds" (UNCRC, 1989, p. 5).

While the CRC was a crucial step in improving children's participation in society, participation and particularly child participation is not only something that is politically controversial but also challenges individuals personal, cultural or religious values (Hart, 1992). In many families the right to freedom of expression and participation in decision-making may often be contrary to the child rearing attitudes of a child's parents or primary caretaker (Hart, 1992). So, while child participation is supported and endorsed by the UN General Assembly, the degree to which children should have a voice has historically been the subject of strongly divergent opinion (Hart, 1992; Martin, 2010).

Child participation (or the lack of) is not an issue exclusive to DRR, it is global and transcends disciplinary boundaries. As Hart argued in his 1992 essay *'Child Participation; from Tokenism to Citizenship'* many people still hold the perception that participation by children is a naïve notion for children who simply do not have the decision-making power of adults. While others feel that children should not be expected to contribute, and they should be protected from the problems of society; that they have the right to a carefree childhood (Hart, 1992; Martin, 2010; Gibbs et al., 2013). Within the field of DRR there is also a common perception that children are unable to raise the wider communities' concerns, therefore child participation is not always encouraged by parents, communities and organisations (Martin, 2010; Mitchell et al., 2009). However, the reality is that children are being increasingly exposed to unpredictable disaster events that can significantly affect their health and wellbeing (Wisner et al., 2018). As Mitchell et al., (2009) points out that excluding children's knowledge and ideas not only threatens their safety if a disaster occurs, but it also dismisses a valuable resource in developing practical risk reduction activities.

2.3.2 Strategies to include children in DRR:

In 2000 the UNISDR launched the first ever Disaster Prevention, Education and Youth Campaign, as an attempt to close the focus on children in DRR (UNISDR, 2000; Delicado et al., 2017). Then on the 13th of October 2011 the International Disaster Reduction day the UNISDR stated that "the young are the largest group affected by disasters" (UNISDR, 2011). This statement catapulted DRR planning and research into action. The rising concern about natural-hazard related disasters at a global level transpired into the Sendai Framework for DRR 2015-2030 (CRED, 2016). The Sendai framework targets are measured on a global scale, with national targets and indicators set to contribute to their success. It was in the Sendai Framework where strategies were implemented to narrow the focus on children in DRR. With target four highlighting the importance of ensuring educational facilities and infrastructure are not disrupted or have limited damage following a disaster to build resilience to disasters (UNISDR, 2015; Delicado et al., 2017).

Strategies to address children in DRR come under various priority points such as investing in DRR resilience and with UNICEF setting out their own DRR goals to support the Sendai Framework. The framework also makes a call for the involvement of children in DRR planning by stating "children and

youth are agents of change and should be given the space and modalities to contribute to disaster risk reduction, in accordance with legislation, national practice and educational curricula" (UNISDR, 2015, p. 23).

Children have become recognised as important communicators of DRR and catalysts of bringing the conversation home with them from school (Mitchell et al., 2008; Tanner, 2010). In another literature review on child participation in DRR, it concludes that participation is not only beneficial for social and educational reasons, but there are a range of positive psychological outcomes of participation for children (Pfefferbaum et al., 2017). However, even in the new era that views children as actors of change there is currently still no overarching agreement on either theory or intervention strategies for working with children in DRR (Wisner et al., 2018; Gibbs et al., 2017; Mooney et al., 2012; Zhu & Zhang, 2017). What there is an agreement on however is the fact that strategies should include not only the child but the child's families, schools and wider community (Wisner et al., 2018; Gibbs et al., 2017; Mooney et al., 2012; Zhu & Zhang, 2017). Furthermore, strategies and frameworks should adopt a child-centred approach that not only recognises but enables children to be agents of change in their own lives (Gibbs et al., 2017; Mooney et al., 2017; Gibbs et al., 2013; Wisner et al., 2018).

The child-participatory agenda is largely upheld alongside the CRC with particular reference to Article 12. In this new paradigm children are recognised as agents of change (Delicado et al., 2017). Children as an agent of change is reflected in Morrow's (2003) 'citizen-child' theory of childhood which recognizes a child's right and capacity to participate and contribute to the decisions that affect their lives (Morrow, 2003; Gibbs et al., 2013). However, there are still several factors that hinder active child participation. Those include not only the power relations between an adult and child, but child and researcher (Gibbs et al., 2013). Another hinderance to the child participation agenda in DRR that Anderson (2005) argues is the fact that most disaster practitioners lack specific child health or child development expertise.

Despite positive, yet anecdotal, evidences around child-centred DRR approaches, several authors argue that strategies are frequently driven by an adult agenda (Mitchell et al., 2009; Tanner, 2010; Aldridge, 2015), this in turn influences the knowledge produced. Within DRR, participatory methods have become a tool to capture a diverse range of local knowledge and provide a platform that enables vulnerable groups to be heard by stakeholders outside local communities (e.g., scientists, decision-makers, etc.) (Goodchild, 2007). Because it is known that vulnerabilities can be amplified by deep-rooted power inequities within communities, participatory methods strive to empower the powerless (Gaventa & Cornwall, 2006; Gaillard et al., 2013). However, participatory methods are vulnerable to many sources of error if they are not carefully designed. As Gaventa (2006) highlights that around the world new opportunities are arising for citizen engagement in policy processes, at both a local and global level. However, despite the widespread acceptance of participation, creating new frameworks and institutional arrangements will not necessarily result in greater inclusion if the dynamics of which power depend on are not fundamentally altered (Gaventa, 2006).

2.4. Moving beyond the talk of participation: Participatory Tools

Participatory methods within the context of DRR include mapping, ranking, transect walks, focus groups, seasonal timelines and Venn diagrams (World Vision, 2013). The mechanisms and tools used to engage children in participatory approaches are critical to ensure that they are both age appropriate and foster participation (Aldridge, 2015). For this reason, a variety of 'child friendly' participatory methods have emerged to involve children in DRR such as; comics, cartoons, board games, card games, role play and participatory mapping (Gaillard et al., 2010). The majority of literature published on child participation in DRR have come as a result of collaborations between NGOs and academics

(Amri, Haynes, Bird, & Ronan, 2017). From this perspective new tools and methods are being constantly tested and child participation documented. However, as children do not represent a homogenous group there are many variables that influence the methods and tools used (Wisner et al., 2018). In this respect finding the right participatory method for children can indeed be more difficult than that of adults.

A challenge with participatory methods is often to make local people's knowledge tangible, usable and communicable to outside stakeholders. Within the context of children there are indeed limited tools available to foster children's genuine participation and enable dialogue with outside agencies. Participatory mapping has been utilised as a powerful tool within DRR that has the potential to provide both opportunities (Chamber, 2008). Participatory mapping is a map-making process that attempts to make visible the association between land and local communities by using the commonly understood and recognised language of cartography (International Fund for Agricultural Development [IFAD], 2009). Cartography is the science or practice of drawing maps.

Participatory maps enable local communities, assisted by 'outsider' groups, to illustrate a visual representation of their territory, perceived natural hazards as well as their capacities, resources and vulnerabilities (Gaillard et al., 2015; Twigg, 2004). Participatory mapping thus allows the knowledge from local communities to become visible and communicable to outsiders. However, participatory maps require a lot of planning and preparation in order for maps to be intelligible to all stakeholders involved, which is seldom achieved in DRR as maps are often filled with technical jargon (Rambaldi, 2010; Gaillard et al., 2015). Participatory mapping approaches that are aimed at children need to be carefully considered if they are to foster genuine participation. Otherwise it can become a one-sided exercise. For this reason, different forms of participatory mapping have emerged to better encompass the diversity of local knowledge and ensure the process is accessible and interactive for all (Gaillard et al., 2015). These include sketch mapping, stone mapping, ground mapping, GPS mapping, aerial photo mapping and three-dimensional mapping (Gaillard et al., 2015).

A tool that has recently been identified for its potential in fostering dialogue and participation amongst a variety of stakeholders is participatory 3-dimensional mapping [P3DM] (Gaillard et al., 2013). As defined previously in chapter one, P3DM consists of building a stand-alone map "based on extracting topographic information (i.e. contour lines) from scale maps, and then constructing a physical model that is used to locate peoples' spatial memories." (Rambaldi, 2010, p. 3). This process of building a 3D map of one's community not only provides a visual representation of sometimes abstract concepts, but it quite literally requires participation in order for the map to be built. However, little to date has been done with children and P3DM within the context of DRR.

Dialogue with children should not be one sided, and it is important that children are listened to (Wisner et al., 2018). Children are not resourceless nor passive victims but hold valuable knowledge about their environment and can be active contributors of disaster risk management. While there is currently no overarching agreement on either theory or intervention for working with children, there are guiding principles that participatory work ideally should adhere to. In Wisner et al (2018) literature review into communicating with children in disasters four principles are highlighted as being at the core of ethical communication with children. These are that participatory work should be; voluntary, personal, interactive and responsive (Wisner et al., 2018). By this Wisner et al (2018) advise that children's participation should be given freely, and the tools used to encourage their participation should be relatable to their daily context and lives. Participatory work done with children should also be a two-way interaction between child and adult or facilitator, to encourage two-way dialogue (Wisner et al., 2018). Finally, participatory work with children must be responsive and relevant to the children's needs (Wisner et al., 2018).

2.5 Opportunities moving forward: participating through play

There are limited tools available that foster children's genuine participation and provide a platform for dialogue with outside agencies. Both games and play can potentially be utilised in order to address these challenges. Play defined in its simplest form is to "engage in activity for enjoyment" or to "take part in (a sport)" (Oxford Dictionary, 2018). Play is especially referred to or thought of as being an activity or pass time of children and a central part of popular culture (Gampbell et al., 2017). Active participation is a critical component of play, and in fact play does not exist without participation. Research shows that the benefits of play are indeed numerous, and play has been closely linked as a facilitator of learning (Reiber, 1996; Granic et al., 2014; Gampbell et al., 2017). In the field of DRR examples of games and play are slowly emerging with 'Stop Disasters' which is an online game launched by UNISDR that requires players to assess and reduce their risk against natural hazards (Gampbell et al., 2017). The LEGO Foundation has also emerged in the field of DRR, with practitioners piloting projects such as the LEGO Risk Mapping Project in India with Save the Children (LEGO Foundation, 2015). The LEGO brick is a symbol of childhood throughout Western culture, and a toy that has been enjoyed by multiple generations. As literature has emerged around games and the power of play, this presents an opportunity to look creatively at ways to close the gap between 'insider' (e.g., children) groups and 'outsider' (e.g., researchers, scientists) groups within DRR.

Literature has repeatedly shown that participation rests upon the principle of power, and the continuum of participation moves accordingly. However, even as participatory methods endeavour to hand over the power to local people, much of the success of participatory research is embedded within the dynamic between facilitators and the community or children. Therefore, the tools and methods used to engage children in participatory approaches should be first and foremost accessible, familiar and appropriate for the children. P3DM using LEGO is a novel idea, that has the potential in theory to plot and map a variety of information in a way that is playful, engaging, personal, interactive, responsive and voluntary to children. Because it is a toy that is mainly used by children this also places the power into their hands, rather than using technical jargon or methods that exclude them from the process. LEGO sets are in fact designed specifically to enable children to build the world as their imagination and creative zest sees fit. It is here where this research seeks to close the gap between the insiders and outsiders within DRR, using LEGO as a P3DM tool (illustrated below in Figure 2.1).

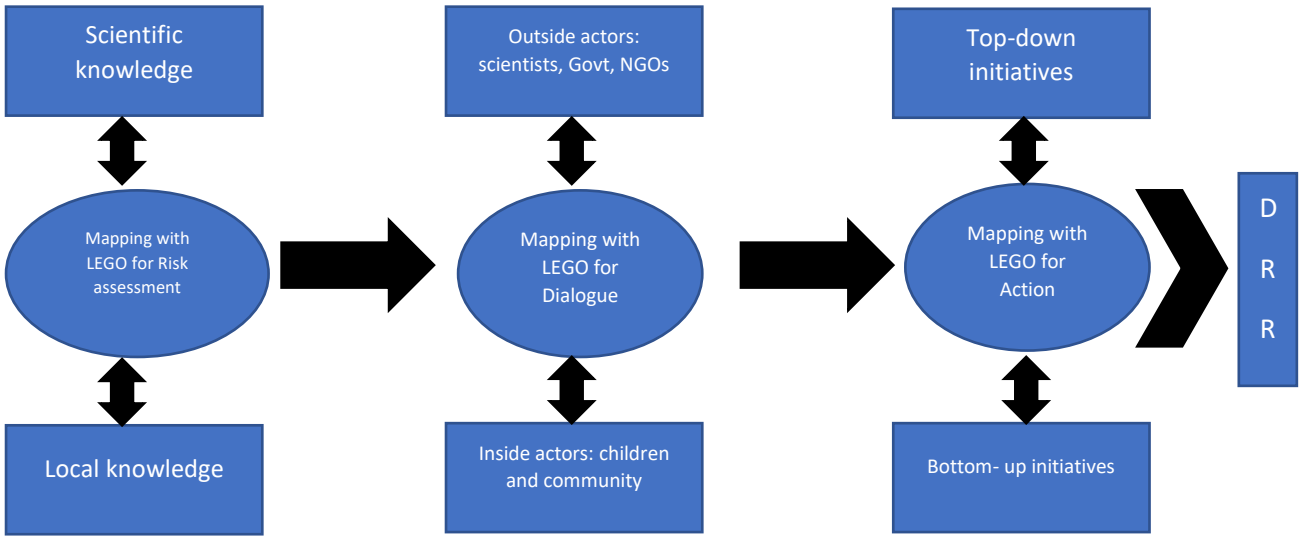

Figure 2.1. Process for integrating knowledge, action and children in DRR with LEGO. Adapted from *Knowledge to action: bridging gaps in DRR* (p93), by J. Gaillard & J. Mercer, 2013.

2.6 Conclusion

This chapter reviewed the literature around children in DRR as well as the different forms and methods of participation. The literature shows that the evolution of DRR has been a gradual process, historically focusing on the geophysical perspective of disaster risk reduction by trying to predict or monitor natural events (Gaillard, 2010). However, since the 1970s this approach has been the subject of much heated debate, where disaster started to be viewed as the collision of extreme physical phenomenon with a vulnerable human population (O'Keefe et al., 1976; Heijmans, 2009). Participation and participatory methods emerged to empower those vulnerable groups within societies and provide opportunities for community inclusion in the decision-making process (Twigg, 2004). When it comes to children in the context of disaster literature and within mass media, they are often referred to as one of the largest vulnerable groups within the human population (Kearney, 2015; Save the Children, 2014; UNICEF, 2014). To date much of the disaster literature has kept the focus on children's vulnerabilities, weaknesses and trauma in the wake of a disaster, so our understanding of children's various capacities is incomplete (Anderson, 2005; Martin, 2010; Pfefferbaum et al., 2014 & Wisner et al., 2018). Therefore, if we wish to reduce children's vulnerability to hazardous events then inclusion should be a priority (Tatebe & Mutch, 2015).

Due to the lack of research in this field, the topic is still within its own infancy and there are very few tangible examples of how to harness children's participation and capacities. Despite this, what is widely acknowledged is the complexities which surround participation and children's participation. However, there are several areas of opportunities moving forward to improve our understanding. Figure 2.1 above endeavours to illustrate a proposed process for integrating children's knowledge and action in DRR, with LEGO. This process has been applied throughout this thesis to investigate the use of LEGO as a P3DM tool to engage children in DRR and advance the agenda of children in DRR research and initiatives. The following chapter will explain the research methodology and methods used for this thesis in order to address the research objectives of this thesis.

Chapter Three: Research Methodology and Methods

3.0 Chapter Outline:

Chapter three will describe the research methodology which informed the methods used in this thesis. The methodology chosen for this thesis is a participatory ethnography method. Participatory ethnography comprises of a range of methodological approaches, all with the objective of handing the 'power' from the researcher to the research participants (e.g., community, school or children) by enabling participants to tell their own story and find solutions that benefit their community (Chambers, 1995; Gaventa & Cornwall, 2006; Aldridge, 2015). In order to make sense of the research methodology this chapter has been organised into five main sections. Section one will introduce the overarching methodology and rationale which informed the research methods. Section two will provide the context of how the research site came about and explain the co-designing process of this thesis, including the research sample used. The third section will discuss how participant and guardian consent was sourced as well as other ethical considerations when working with children. Section four of this chapter will be dedicated to the tools and methods used as a researcher and facilitator to enable dialogue and foster active participation, followed by the process used for analysing the discussions. The fifth section will summarise the chapter.

3.1 *Introduction: Research Methodology*

My research is qualitative in nature with an emphasis on verbal narratives, map annotations and dialogue amongst the children and with myself, while building the LEGO map. While I did use some counting and ranking methods, this was merely a facilitator strategy to facilitate collaboration and ensure the children's views and opinions had been understood correctly. My sample size was small and not representative of children, compared to quantitative research which uses a large cohort. However, the information produced is detailed observations, children's own words and narrate an in-depth story through the process of building a LEGO map.

My primary role throughout this thesis is a researcher. I moved to Napier to examine if participatory 3-dimensioanl mapping [P3DM], using LEGO, is an effective tool to foster children's participation in disaster risk reduction. P3DM as defined in chapter two is a participatory mapping method that consists of building a stand-alone 3-dimensional and scaled map of a defined area, usually made of locally available and cheap materials (e.g., cardboard, carton, paper-mache) (Gaillard et al., 2013; Rambaldi, 2010). It enables topographic landmarks, including land use and indigenous spatial knowledge to be depicted by push pins, yarn and paint (Gallards et al., 2013; Rambaldi, 2010). P3DM has been identified as a method that has the potential to bridge the gap that exists between 'outsiders' (e.g., researchers, geologists, scientists and engineers) and 'insiders' (e.g., indigenous people, ethnic minorities, children and community members) (Rambaldi, 2010) as it results in a tangible and visual representation of a community.

As a researcher it was my role to assess the strengths and limitations of LEGO as a participatory mapping tool and evaluate the role of LEGO in producing children's knowledge and its best practice moving forward. However, in their review of participatory research Cornwall and Jewkes (1995) asked a question, which I found myself repeatedly asking when designing this thesis: '*if all research involves participation, what makes research participatory?*' (p. 1668). The basic tenet and role of the researcher in participatory research is that "people are- and should be- the starting point, the centre, and the end goal" (Cernea ibid, p.3). Or as Robert Chambers, one of the pioneering and populist advocates of participatory research, says it is about "putting the last first" (Chambers, 1983).

My secondary role throughout this thesis, was that of a facilitator. As a facilitator, it was my job to make the process run smoothly not just with the children involved in the research but with school teachers, other researchers and to a lesser extent with the wider community stakeholders involved (CDEM and East Coast Labs). Facilitation is defined as the "process through which a neutral third party encourages participation through appropriate activities and inclusive decision-making" (Gaillard, Amirapu, Hore, & Cadag, 2018). While I designed the entire process in collaboration with the school teachers and other researchers, my role as the researcher and primary facilitator over the course of this thesis did not make me a "neutral third party". Rather I was intrinsically weaved into the entire process, and in turn would influence the knowledge and findings produced.

In order to utilise the insight and findings that came from these two roles, I turned to ethnography. Ethnography is the systematic study and description of people and cultures in their everyday setting (Bloomberg et al., 1993). While I would always strive to ensure the first voice that is portrayed in my research findings was that of the children, I could not ignore the voice and insight that I had as the researcher, facilitator and guest in this community. Combining both participatory and ethnography methodologies complimented each other with their overlapping characteristics (Table 5 below).

Table 5.

Characteristics of Participatory and Ethnography Research

Characteristics of Participatory Research	Characteristics of Ethnography Research
• Generally Qualitative Research • Insider knowledge highly valued • Knowledge produced generate or promote solutions that fit the community • Knowledge belongs to the community	• Qualitative Research • Communities perspectives • In depth and descriptive understanding of everyday world • Research not only collect information but gain 'insider' perspective

Note. Author's Own adapted from Bloomberg et al., 2013; Chambers, 1995; Pretty, 1995.

Finally, I found myself playing a third role, which was me as an individual and person removed from my role as a 'researcher' or 'facilitator'. In this role I was constantly questioning and cross checking my actions as both a 'researcher' and 'facilitator' and whether these aligned with my personal values and ethics. As my research methodology is participatory ethnography, it was my goal to enable a platform for children to narrate and tell their story (Limb & Dywer, 2001). However, in order to do this, I needed to build trust and gain respect from both the students and the wider community. Yet I was also working within a defined time frame, that was given to me by the school teachers and my own research deadlines.

Trust and respect are not things you can instantaneously gain, nor are they things you can ask for. In order to build trust and keep the project agenda moving, I would find myself arranging 'accidental' visits with community members or I would volunteer at community events such as the market day. Ensuring I gained trust and respect from the community was crucial. I knew that being a friendly and enthusiastic member of the community, would help build rapport and add to the success of my own research as students and community members would feel more comfortable in engaging in dialogue. In this role I could recognise at times the steps I have taken as a researcher or facilitator were self-serving. As an individual I had to put myself in situations which did not come naturally to me, but I would have to reflect on this and balance my other roles of researcher and facilitator almost as a third party.

The internal strife which I describe above is hardly a new concept, nor am I the first researcher to ever express or feel this dilemma (Tracy, 2010). When designing any research project, the most common recommendation is being able to identify if there is error, and whether the error is random or systematic (Webb & Bain, 2010). This should all be done with continuous self-reflection throughout the entire research process (Curry et al., 2009). Participatory ethnography strives to provide a 'voice' to those who are vulnerable within societies, however both research methodologies can be vulnerable to many sources of error if not carefully designed (Oleckno, 2002).

One of the most common challenges is the participation itself, which depends on the power relationships surrounding the research process (Gaventa, 2006). This can in turn result in selection bias. If bias exists within a study, this is a systematic error, and will only increase with the sample size (Webb & Bain, 2010). Therefore, identifying where a bias may exist is crucial when designing any participatory research (Aldridge, 2010; Chambers, 1995, Oleckno, 2002). Selection bias is when there is a systematic difference between those who are included in the study and those who are not (Webb & Bain, 2010). A common way in which selection bias can occur is through voluntary participation (Webb & Bain, 2010). This concept might seem counter intuitive as the purpose of participatory research is to result in active and voluntary participation, however if the process by which participants can volunteer is not equitable to all community members (e.g., women, children, ethnic minorities) then this may result in dominant members of a community (e.g., men, adults or tribe leaders) leading the dialogue and biasing the knowledge produced (Cooke & Kothari, 2001).

Participatory ethnography is both a participatory and qualitative research method that is often used with 'hard to reach' or vulnerable groups such as children (Webb & Bain, 2010). Under this methodology I can use the voice of the children and the researcher's observation on the effectiveness of LEGO as a participatory mapping tool. But as a facilitator I am continuously reflecting on my actions and facilitator tools, to ensure equitable and inclusive participation by all students.

3.2 *Location of Study*

Maraekakaho was the chosen research site for this thesis because the community themselves had approached CDEM, with a request for a wider community resilience plan. This community led conversation sparked a collaboration with East Coast LAB, Hawke's Bay Regional CDEM group, and researchers from AUT and The University of Auckland. The local practitioners from East Coast LAB and CDEM played a central role in the initial relationship building with Maraekakaho primary school. This relationship naturally progressed as the Maraekakaho Civil Defence volunteer leadership group, hosted many of their meetings and group gatherings at Maraekakaho primary school. The fact that the community themselves initiated the conversation and requested a wider community resilience plan was a crucial step in gaining community and school buy in.

Maraekakaho has experienced a range of natural hazards in the past with the most common hazards being flood, drought and bush fires. In 2007 the school and local fire brigade had to be evacuated due to extensive flooding (Figure 3.1). The communities active Civil Defence Volunteer Facebook page and MKK Rural Fire Brigade Facebook page are often used to post community notifications and photos of events (Figure 3.1, 3.2 and 3.3).

Figure 3.1. Maraekakaho 2007 Flood. Source: J. Stockley. (2018).

Figure 3.2. Maraekakaho 2017 Fire. Retrieved March 5, 2018 from www.facebook.com/Mkkruralfire/

Figure 3.3. Maraekakaho 2017 Fire. Retrieved March 5, 2018 from www.facebook.com/Mkkruralfire/

Following the Maraeakakaho Civil Defence Volunteer group approaching CDEM, a meeting was set up between the Maraekakaho Principal, teachers, CDEM, East Coast LABs and researchers from AUT and The University of Auckland. This meeting was to introduce the researcher (myself) and explain the proposed project, identify expectations and answer any questions that arose. The school was provided with written information and consent forms, explaining the details of the project, and contact details were exchanged. This meeting took place on the 20th of November 2017 and is recorded in my notes as: *first meeting with stakeholders*.

- Present at meeting: MKK School Principal and teachers, East Coast LAB practitioner, CDEM practitioner and AUT researchers.

At the end of this meeting the school principal and teachers expressed their interest to participate in the research project and a rough guideline of when I should make contact again was suggested by the teachers, so planning could commence.

The *Second Meeting* took place on the 17th of January 2018 and is recorded in my notes as: *second meeting with key stakeholders*.

- Present at meeting: MKK School Principal and teachers, East Coast LAB practitioner and AUT researchers.

This meeting was to outline a proposed timeline, confirm logistics and co-design the sessions that were to be run with the children. This was done in partnership with the teachers to ensure the project would fit well with their schedule, school philosophy and ensure a balance in power between researchers and teachers. It was in this meeting that we decided I would be given 90-minutes twice a week from week five to week 10 of term one.

The *Third Meeting* took place on Wednesday the 27th of February 2018 and is recorded in my fieldnotes as: *third meeting with teachers to finalise student sessions.*

- Present at meeting: MKK Teachers and AUT researcher (myself).

During this meeting the teachers decided that I would be able to work with the students every Wednesday and Thursday afternoon from 1:30pm- 3:00pm. In this meeting the teachers were given a hard copy of the intended session plans. We decided to debrief at the end of each session to make any amendments to the plan or discuss any issues that either party faced. If sessions were amended (as a result of time constraints or feedback given) a new copy of the plan would be circulated. The research site was crucial in the co-designing of the tools and methods used, as the community initiated and led the process from the moment they approached CDEM.

3.2.1 *Research Co-Design:*

Participatory ethnographic research should work in collaboration with individuals and communities to find solutions that benefit the wider community (Higginbottom & Liamputtong, 2015). The fundamental premise is that the distinction between the researcher and those that are researched breaks down and 'insider' knowledge is highly valued (Ross, 2012). At the core of my thesis is the idea that participation is crucial in creating sustainable change. In chapter two I discussed the ladder of participation, which starts from passive, token participation moving towards active participation then reaching the overall goal of participation which is transformative and creates sustainable change (Arnstein, 1969; Hart, 1992). The below figure illustrates this continuum of participation (Figure 3.4).

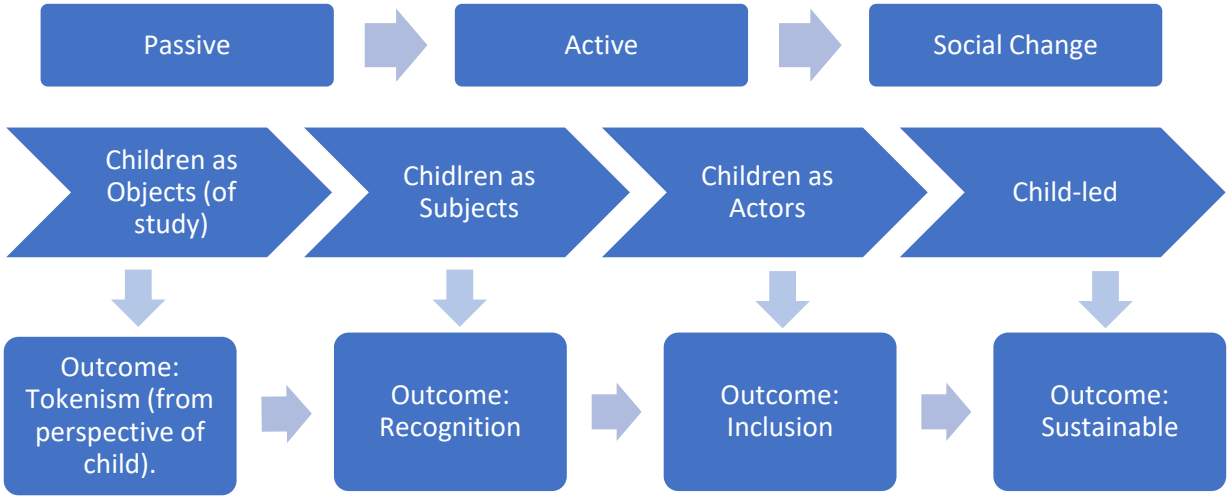

Figure 3.4. Continuum of Participation. A*dapted from Participatory research: working with vulnerable groups in research and practice* (p. 156), by J. Aldridge, 2015, Bristol, Great Britain: Policy Press. Copyright 2015 by Jo Aldridge.

Participatory ethnography research that is done with people, instead of done about people are successful because the research design has carefully considered the following concepts: power dynamics, the process and the participants priorities (Chambers, 1995, Gaventa, 2006). The designing of how the knowledge was produced was a continuous and ongoing process that involved both the school teachers and children. The teachers played a pivotal role in the tools used to engage with the students and the logistics such as time and group sizes, as I knew that ultimately, they knew their students best. While the continuum of participation as displayed above in Figure 3.4 takes a linear approach, I felt that the actual research co-design was a cyclical and continuous, ongoing process (as

illustrated below in figure 3.5). Participatory ethnography research requires flexibility and a researcher and facilitators ability to be adaptable. The activities and tools used were co-designed with the teachers and students. My role as the researcher and facilitator to ensure that the corner stones of participation; power dynamics, participant priorities and the process was continuously evolving, equitable and encouraged open dialogue.

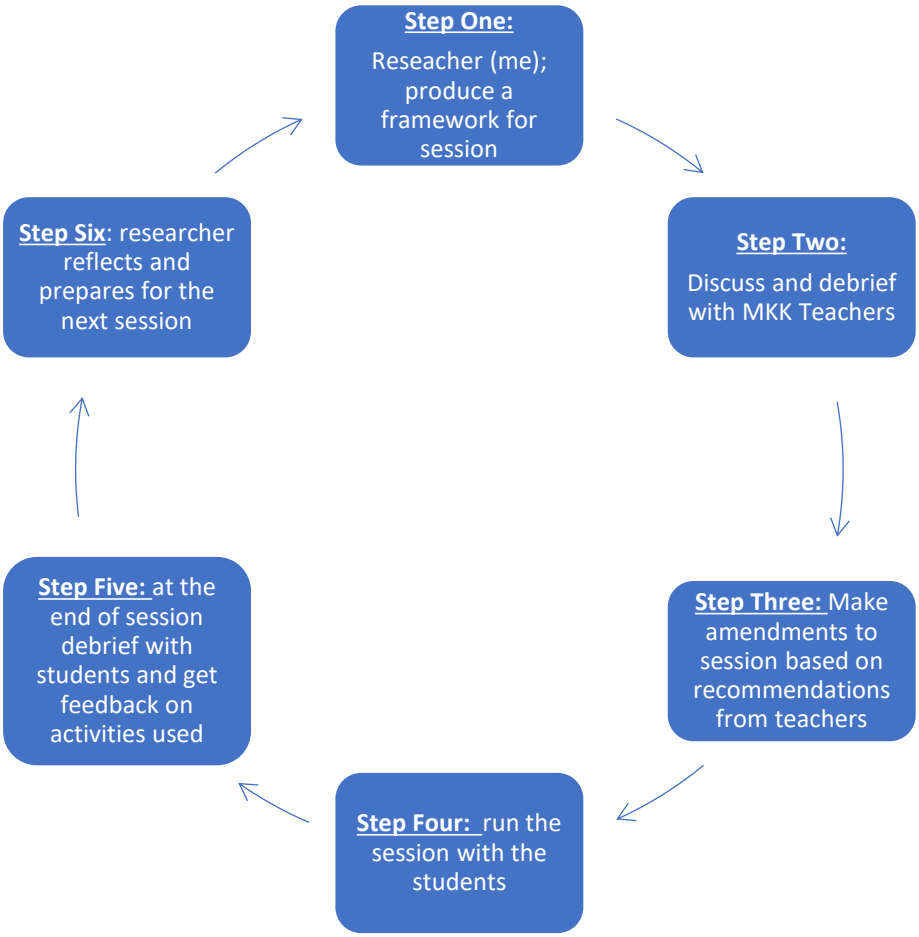

Figure 3.5. Process of Co-Design. (*Author's own, 2018).*

3.3 *Research Sample:*

The wider project sample was decided by the Maraekakaho school teachers. A total of 90 students from year five to eight (aged 8-12 years) were involved in the wider project. The teachers decided that all 90 students would learn about natural hazards and break out into smaller 'technology project teams'. All 90 students were given the option to be involved in the following 'technology project team' (as shown below in table 6).

Table 6.

Students Technology Project Team Options

	Students Technology Project Teams
1.	LEGO mapping
2.	Minecraft mapping
3.	Film
4.	Three-dimensional printing
5.	Robotics

Note. Author's own, 2018.

Students wrote down which group they would like to be involved in, and the teachers organised which student were assigned to which technology project team. This step has been recognised in my methodology chapter as I believe it was an important step in my thesis research. This is because the students themselves got to choose their groups based on their interest. Therefore, all the students who ended up being involved in the LEGO group actively requested to be involved. While it can be argued that their participation was somewhat mandatory due to the school setting, the children did have the option of choosing alternative technology project teams. The only request I made to the teachers was to be given a maximum of 15 students aged 10-12 years. My sample size included 13 students aged 10-12 years.

Table 7.

Sample Group Basic Profile

LEGO Group Profile (2018)	
Total Group Size	13
School Decile	9
Median Age	11 years
Males	5 (38.46%)
Females	8 (61.54%)

Note. Author's own, 2018.

3.3.1 *Ethical Consideration:*

No research design, especially one that involves children is free from questions around ethics. A common question that I was asked when designing, implementing and even after conducting my field work was: is it ethical to include children and worry them about disaster risk reduction? While I do understand the logic behind such thinking, my initial reaction to this question is: is it ethical to deliberately not include children in disaster risk reduction? Many of the ethical considerations that arose throughout this research process will be discussed in my discussions chapter, however it is also important to reflect on ethical considerations as a standalone issue.

Ethical approval (17/263) was gained from Auckland University of Technology Ethic Committee (AUTEC) for this research project. The key ethical consideration was to ensure no harm came to any of the participants. It was my role as the researcher to ensure all information gathered remained private and confidential to the participants. Ethical protocols and procedures outlined by AUTEC were always followed throughout the research project. A major ethical consideration was the process in which participants gave consent to be involved in the research. For this thesis consent had to be gained from both parents and students. To gain community buy in it was decided with the school principal and teachers that the consent process would be led by the school itself. Communication was sent out via the school newsletter and informed and written consent was gained from each research participant and their legal guardian, and participation was on a voluntary basis. Please refer to appendix one for a copy of the consent form and appendix two for a copy of the participation information sheet, that was disseminated via the school newsletter.

Students had the right to turn down or leave the research project at any stage. However, it must be noted that there is an element of 'hierarchy' between myself (being an adult) and the students (being children). It was my duty as both the researcher and facilitator to reflect on these power dynamics and use a variety of strategies to balance out the power relations between myself and the students. I strived to achieve this by facilitating each session with an open-door policy where students had the right to leave at any stage by their own choice. I also sat on the ground with the students during group discussions, and only ever introduced myself as 'Nikki' and not 'Miss Loodin'. I would also have music playing during the building process to create a more relaxed atmosphere, that felt different to a rigid classroom setting. Additionally, I was mindful of how I dressed. By this I mean I avoided wearing anything that might make me seem authoritative or draw attention to the fact that I was 'from Auckland' and an 'outsider'. Despite these strategies there was always going to be an unequal power dynamic between myself and the students because of the school setting, where at large the power is placed with the adults rather than the children.

Earlier in the chapter I discuss the three roles I played throughout this thesis: the researcher, the facilitator and the individual. While it might have seemed strange to reflect on myself in third person, this was a crucial and under estimated process that informed my method. In qualitative research this process is often referred to as reflexivity. Reflexivity is the process by which the researcher is consciously aware of how she/he might influence the data and research itself (Probst, 2015). By engaging in productive self-reflection, the researcher can perhaps better understand the wider influencers of the research and also any potential errors (Probst, 2015). This process for me was continuous and ongoing and I believe a major part of my research ethics. I used this self-reflection to ensure, both students and teachers were not being pushed into situations where they felt forced or swayed by an outsider (myself). Throughout this self-reflection process I was trying to gain trust and respect gradually by being mindful of my actions, words and behaviour, rather than demanding trust and respect from the beginning.

3.4 *Producing Tangible Knowledge: Researcher and Facilitator tools*

As this thesis uses participatory ethnography methods, theoretically, there should be no such thing as data collection (Gaillard et al., 2013). Data collection is the gathering of information on variables of interest to a researcher or organisation and implies an extraction of information from a community (Cornwall, 2010; Webb & Bain, 2010). However participatory ethnography methods want to understand, enable two-way dialogue and find solutions to problems that are relevant to communities, rather than researchers or organisations. These methods strive to create research with a community, rather than use extractive methods that take information away from a community (Chambers, 1995; Cornwall et al., 2010; Aldridge, 2010; Le De et al., 2014). Therefore, I will not use

the term 'data collection', but rather discuss the tools I used as a researcher and facilitator to enable an equitable process of two-way dialogue. This process took two phases and was a cyclical process (as illustrated in Figure 3.5), which required me to be both flexible and adaptable.

Phase One:

Table 8.

Phase One: Alpha 7's Class Basic Profile

Alpha 7's Class Profile (2018)	
Total Class Size	37
School Decile	9
Median Age	11 years
Males	18 (48.65%)
Females	19 (51.35%)

Note. Author's own, 2018.

Phase one was from session one to session four (outlined below). Before the mapping could commence it was necessary to initiate a dialogue with the students who would be involved in the research. The teachers decided that it would benefit them if a wider conversation around DRR within the school community could take place, before the students broke into their smaller project teams. This would also help build trust and rapport with the students so when the mapping commenced the students felt comfortable and familiar with me. The tools used for these four sessions, were co-designed with the teachers. This included meeting with them prior to each session and discussing the different activities that were to be carried out, making adaptations to activities based on advice from the teachers (specifically around time, cultural appropriateness, community context and the students age). Students were also given an opportunity at the end of each session to provide feedback and recommendations this was encouraged both anonymously (via the Stop- Go Jar) and in group discussions. The activities outlined below were chosen from Chambers (2000) *Fun with 21s* a resource book for facilitators approaching participatory workshops in the field of DRR.

Session One: 45minutes – Wednesday 7th of March, 2018.

Background: This session was to introduce myself and the project to the children, and for the children to introduce themselves to me.

Desired outcome: children left understanding the research project and they knew who I was. The second outcome of this session was to set class expectations and answer any questions that the children might have about the project.

Table 9.

Session One Outline

Time allocation	Topic	Activity	Activity Explanation	Resources

15mins	Introduce: - The Project - Myself - Students	Group discussion.	Facilitator and children introduce themselves.	Slides.
30 mins	Expectations: What they expect of each other and the facilitator throughout the project. Summarise	In groups of five the children write down their expectations. We debrief as a class.	The aim of this activity is to set class rules. The children write down their expectations they have for each other and what they expect from me as a facilitator. For example, they expect that I will create a supportive learning environment.	Flip charts, pens, post it notes.

Note. Author's own, 2018.

Session Two: 90 minutes- Thursday 8th of March, 2018

Background: The second session was an initial stock take of what the children's level of understanding was around concepts such as hazards, community, vulnerability and capacity. This was to be achieved by using activities from Chambers (2000) facilitator resource manual and recommendations from the teachers.

Desired outcome: the aim of session two was to engage children in an open discussion around the concepts such as hazards, community, capacities and vulnerabilities. Another purpose of the session was to contextualise these concepts to their community. For example, discussing what hazardous events may have occurred in Maraekakaho in the past. Students were also encouraged to talk to their family, community members and teachers when they left the session about hazardous events that have occurred in the past and what they did to cope.

Table 10.

Session Two Outline

Time allocation	Topic	Activity	Activity Explanation	Resources	Facilitator
10 min	Recap and today's agenda.	Class discussion		Summarised flip charts of their expectations.	Nikki.
15 mins	What is a community?	One Word Activity: Community.	Participants are given a word in this instance the word was 'community' they are given a pen and post it note to write down one word that they believe best describes 'community'. Then	Post it notes, felt pens, flipchart.	Nikki.

			after the designated time, each participant states their one word, and place their post it note on the white board. Once we have all the words to describe 'community' we have a class discussion around the most common words that arose and why.		
30mins	Define the following: Natural hazards, Capacities / Strengths, Vulnerabilities / Weaknesses Debrief: What are potential natural hazards that they remember or have been told about? What strengths do they as a community have? What weaknesses or challenges as a community do they face?	Carousel (5 students per group)	Carousel: the room is set up with different stations. At each station is a word or phrase e.g., 'Capacities and Strengths in Maraekakaho'. Participants are given 5-7minutes at each station to write down as many definitions or descriptions of what they interpret that word or phrase to mean. Once the time is up the group moves in a clock wise direction to the next station. The activity continues until the participants reach their original station, much like a carousel.	Flip charts, pens, post it notes, timer.	Nikki and teacher.
15 mins	Reflection:	Class discussion and Stop - Go Jar.	Stop- Go Jar: a jar is left at the front of the classroom and	Post it notes, jar and pens.	Nikki.

	What did they enjoy today? What didn't they enjoy?		collected at the end of each session. Green post it notes and red post it notes with pens are left by the jar. The green post it notes represent 'go.' Participants can write down feedback or activities that they enjoyed or want more of on the green for 'go' post it notes. The red post it notes represent 'stop', here participants write down feedback or recommendations for what they didn't enjoy or want the facilitator to stop doing.		
15 min	Pack up				

Note. Author's own, 2018.

Session Three: 90-minutes- Wednesday 14th of March, 2018.

Background: The third session was designed so students can identify natural hazards, vulnerabilities (weaknesses) and capacities (strengths) within their community.

Desired outcome: the aim of this session was to contextualise the concepts discussed last week such as vulnerability, hazard and capacity and how they relate to their community. This information is then displayed on A1 aerial photos of Maraekakaho.

Table 11.

Session Three Outline

Time allocation	Topic	Activity	Activity Explanation	Resources	Facilitator
15 min	Recap and today's agenda.	Class discussion.	As a class we summarised the flip charts with their definitions from previous week. Then I provided them with definitions of vulnerabilities, hazards and capacities to compare how the	Last week's flip charts, photos.	Nikki.

			different definitions aligned or differed. Then we looked at photos of past natural hazards in MKK to contextualise the concepts discussed.		
45 mins	Introduction to mapping: Plotting vulnerabilities, hazards and capacities in MKK.	The class is split into two groups (18 students and 19 students). Each group are given an A1 photo of MKK. Students were given a list of things to identify on the photo: vulnerabilities, hazards, capacities and their community boundary.	During this activity students were given an A1 aerial photo of their community and a packet of stickers, pens, tape and yarn. On the photo they were to identify, using the stationery provided, areas that they thought might be vulnerable to hazards and capacities within their community. They had to come up with a key or a legend for their map, so outsiders were able to read their map. For example, a 'star' may represent a community capacity while a 'red dot' represented a hazard in the community.	Two x A1 aerial photos of MKK, pushpins, yarn, stickers, rulers, pens and tape.	Nikki and teacher.
15mins	Stop - Go Jar and pack up				All.

Note. Author's own, 2018.

Session Four: 90-minutes- Wednesday 21st of March, 2018.

Background: by now students will have begun to define their community boundaries and identified hazards, vulnerabilities and capacities in their community. Feedback from the previous week by children and teachers were around smaller group sizes, time allocation and providing clearer instructions. Lessons learnt from the previous week and feedback from children and teachers was implemented.

Desired outcome: the aim of session four was for the children to complete their mapping exercise from the week before with a greater understanding of the concepts of 'vulnerability', 'hazards' and 'capacity' within their community setting followed by a full class debrief.

Table 12.

Session Four Outline

Time allocation	Topic	Activity	Activity Explanation	Resources	Facilitator
15 min	Recap and today's agenda.	Class discussion			Nikki.
30 min	Complete mapping: Students are to finish plotting their community: vulnerabilities, hazards and capacities on A1 aerial photo. Carousel preliminary legend: What has happened in the past, what did people do to cope and who was affected?	Group One: mapping exercise group and carousel preliminary legend group. Group Two: mapping exercise group and carousel preliminary legend group.	Group One and Group Two were both split into two smaller groups (there are now four groups). Group One A & Group Two A: are to finish identifying hazards, vulnerabilities and capacities on the A1 aerial photos from last week. Group One B & Group Two B: are to work on the carousel. There are three stations each with a different question that they spend 5- 7minutes at: 1. What natural hazards have happened in MKK in the past? 2. What did people in MKK do to cope? 3. Who was affected by this event?	Aerial photos, flip charts, pens, stickers, push pins, yarn.	Nikki and teacher.
30 min	Debrief: Class discussion and time for questions Stop- Go Jar	Show and tell: each group summarises what they have done and shows their A1	Group One A & Group Two A: show the rest of the class their completed 'maps' and other class members have the opportunity	Aerial photos, flip charts, pens, yarn, stickers.	All.

		photo to the rest of the class.	to ask questions. The maps are left at the front of the class on the wall. Group One B & Group Two B: show the rest of the class their answers to the questions at each carousel station. Then we discuss using the maps at the front of the class where on the map these events occurred and who was affected. Using the stickers, pens and yarn the class plots this information onto the map (if it is not already on the map).		
15 min	Pack up				

Note. Author's own, 2018.

Phase Two:

Phase two was from session five to 15 (outlined below). Phase two involved 13 students who were selected from the Alpha 7's class. Phase two was where the P3DM began, the overall framework for phase two was informed by Rambaldi's (2010) *Participatory Three-dimensional Modelling: Guiding Principles and Applications* resource book. From Rambaldi's (2010) resource book the P3DM process takes seven phases: preparatory work, assembling the model, depicting information, handing over the model, extracting data from the 3D model, data elaboration and manipulation then field verification. However, given the confined timeframe adaptations were made based on recommendations from the teachers and students. It must be noted that this thesis only undertook: preparatory work, assembling the model, depicting information and handing over the model. The reasoning for this will be further discussed in my results and discussion chapters.

At large phase two of the research project was led by the students themselves. During phase two it was my role as the facilitator to assist the students with their progression by securing enough LEGO bricks, being available to open the school library (where the map building took place) and ensuring the group worked in a collaborative and cohesive manner. My role as the researcher during phase two was to take field notes, observe the students and engage the students in continued dialogue about their progress.

Session Five: 90-minutes- Thursday 22nd of March, 2018.

Background: students have been organised by the teachers into their smaller technology project teams.

Desired outcome: the aim of session five is to get to know each other better and get an understanding of everyone's experience with LEGO.

Table 13.

Session Five Outline

Time allocation	Topic	Activity	Activity Explanation	Resources
15 min	Students are assigned to their project teams.			
30 mins	Introduction and expectations:	Students introduce themselves.	In a circle the students are to tell the rest of the group: their name, one thing interesting about themselves, one expectation they have for each other over the course of this project and why they choose to be in the LEGO group.	
30 mins	Introduction to LEGO.	Free play with LEGO	Students are given time to play with the LEGO. Throughout this free time, I was watching the group dynamics and identifying who might be potential group dominators, quieter students and students who might be harder to engage with. I was also looking to see which students hold respect of other students. This identification process was important in my future planning and the facilitator tools I would use.	LEGO.
15 min	Pack-up			

Note. Author's own, 2018.

Session Six: 90-minutes- Wednesday 28th of March, 2018.

Background: children will begin working on their legend. Developing a legend for the map is one of the most important steps in the P3DM process. The legend is the key to reading and understanding the map, it is not only useful for participants during the building process but also crucial in ensuring outsiders can learn and engage with the map (Rambaldi, 2010).

Desired outcome: the aim of session six is for children to define their legend and categorise what colour bricks represent what 'things' on their map.

Table 14.

Session Six Outline

Time allocation	Topic	Activity	Activity Explanation	Resources
15 min	Recap and today's agenda.	Group discussion.		
30 mins	Developing preliminary legend: What can be mapped vs. what cannot be mapped	Group discussion and preliminary legend.	Prior to the session I had prepared two flip charts. One flip chart had the title 'What can be mapped?' and on the second flip chart the title 'What can't be mapped?'. As a group they were to collectively decide on all the things they could and could not include on their map. To ensure every student contributed they were all given two popsicle sticks. Once you had contributed to the list you placed your popsicle stick in the middle. Every student was to use their popsicle stick to ensure everyone had a turn at speaking. This facilitator tool was taken from Chambers (2000) resource book.	Flip charts, felt pens, popsicle sticks.
30 mins	Refining legend: Of those things that can be mapped what will be a line, zone and a dot on the map?	Group Discussion: What is a line? What is a zone? What is a dot?	When building a P3DM hazards, capacities, vulnerabilities and other local knowledge is identified on the map using lines, zones and dots (or points). From lists of things that 'can be mapped' we categorised each item as either a line, zone or dot. For example, a road might be represented on the map using a line. A house might be represented on the map using dot. The students were able to refer to the A1 aerial photo to help guide their discussion on whether	Flip charts, pens and A1 photo.

			something will be a line, dot or zone on their map.	
15 min	Pack-up			

Note. Author's own, 2018.

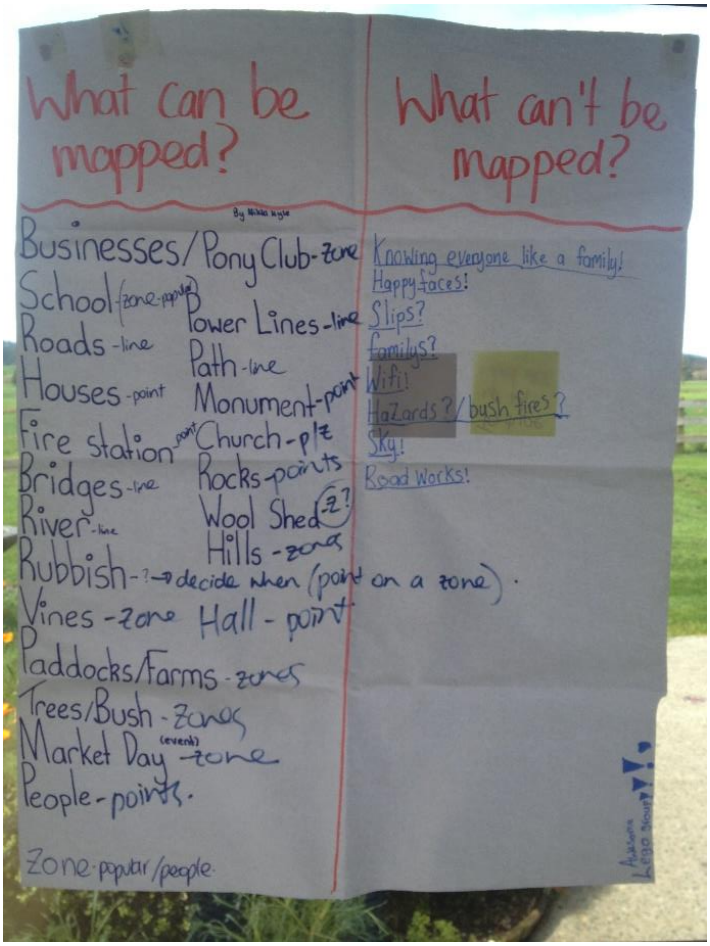

Figure 3.6. Preliminary legend of things that could be mapped vs things that can not be mapped. Author's own, 29th March 2018.

Session Seven: 90-minutes- Thursday 29th of March, 2018.

Background: students have been introduced to the concept of a legend.

Desired outcome: students will complete their preliminary legend.

Table 15.

Session Seven Outline

Time allocation	Topic	Activity	Activity Explanation	Resources

15 min	Recap and today's agenda.	Group discussion.		
45 mins	Finalising their preliminary legend: Lines, zones and point. Assign colours: What colour bricks represent different land use.	Group Discussion: What is a line? What is a zone? What is a point? What colours represent different: points, lines and zones.	The students were to finish assigning the items on the map into the three categories: lines, points and zones from the week before. From here students were split into three groups. Group one was to assign a colour brick to all the items on the 'points' list. Group two was to assign a colour brick to all the items on the 'lines' list. Group three was to assign a colour brick to all the items on the 'zones' list. For example, the road is a 'line' and will be built with black LEGO bricks. Houses are a 'point' and will be built with red bricks.	Flip chart, pens and LEGO.
15 min	Pack-up			

Note. Author's own, 2018.

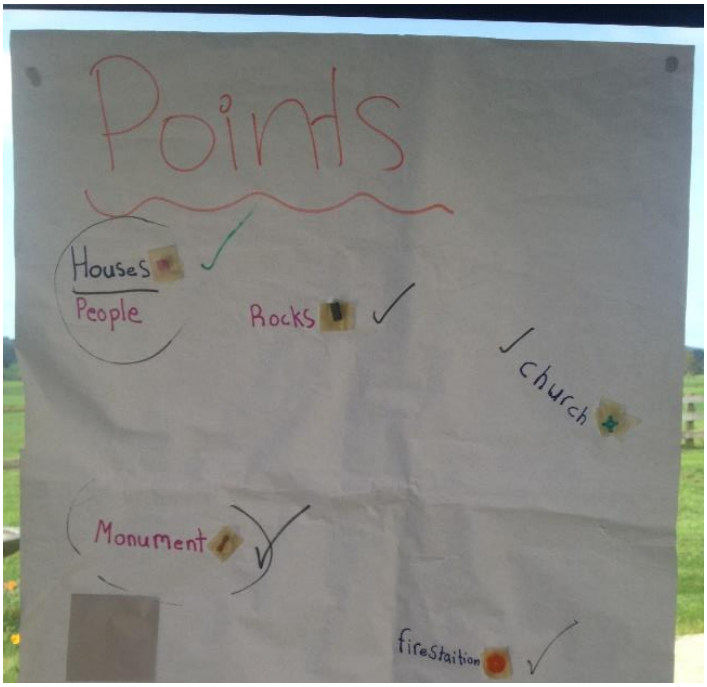

Figure 3.7 Preliminary legend where students assigned coloured bricks for the points on their map. Author's own, 30th March 2018.

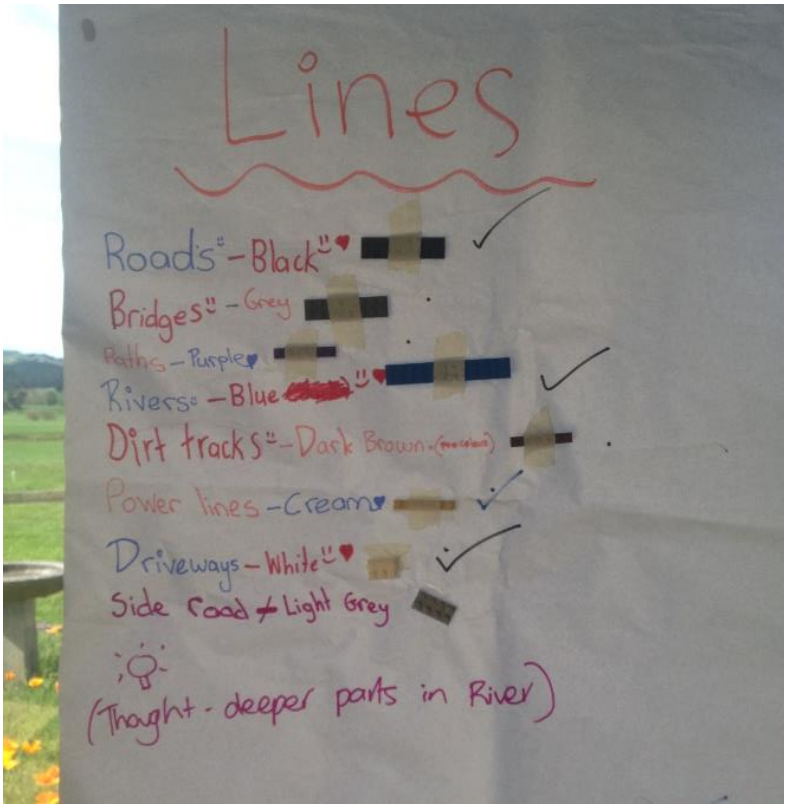

Figure 3.8. Preliminary legend where students assigned coloured bricks for the lines on their map. Author's own, 30th March 2018.

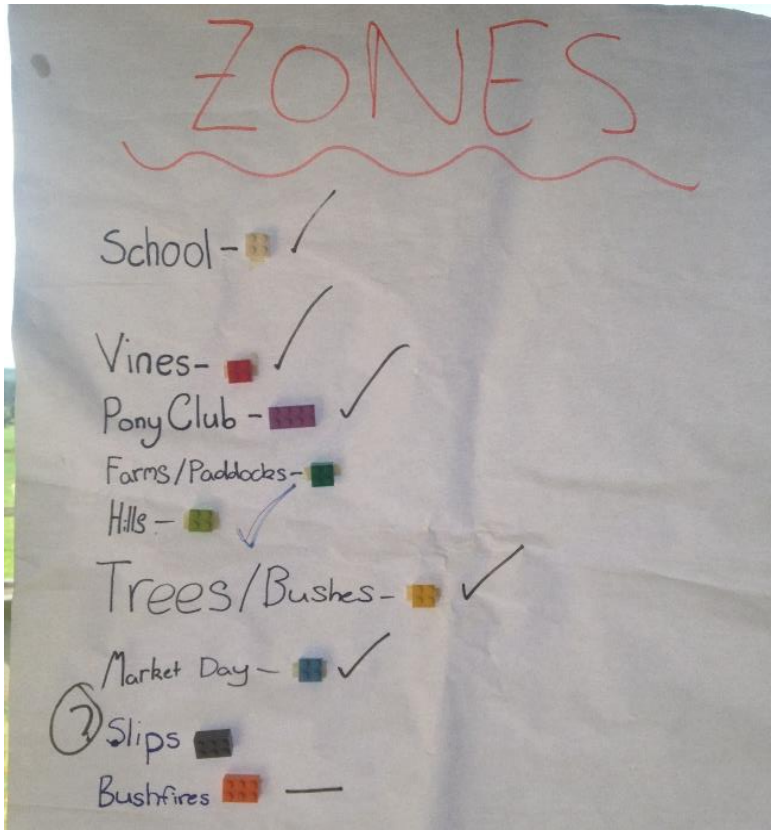

Figure 3.9. Preliminary legend where students assigned coloured bricks for the zones on their map. Author's own, 2018.

Session Eight: 90-minutes- Wednesday 4th of April, 2018.

Background: LEGO map building begins. To ensure a 3D map is useful, it must accurately show locations, distances and elevations on a given base of a convenient size (Rambaldi, 2010). This is referred to as the 'base map'. This means that everything on the map (e.g., elevation) must be displayed in proportion to its actual size. This proportion is the scale of the map (e.g., 1cm: 100m). However, there are some exceptions when scaling which include symbols like lines and dots to represent roads and houses. This is to ensure that they are large enough to be visible on the map. The size of the base of the map will be dictated by the time allocated and resources available to build the map.

Prior to building the map I had liaised with the teachers on the room available to store the map. We had been given a large table in the school library to build and store the map on. A topographic map was organised by the myself which was 190cm x 114cm and represented an area of 3.12km x 1.92km; this was the community boundaries identified by the children. A scale of 1 LEGO (2 x 1 stud) brick: 10 metres in elevation was used. This scale was previously worked out with advice from other academics and practitioners in the field of DRR. This size was dictated by resources, time and provided a user-friendly scale for students to work with.

Desired outcome: students will begin building the base of the map.

Table 16.

Session Eight Outline.

Time allocation	Topic	Activity	Activity Explanation	Resources
15 min	Recap and today's agenda.	Group discussion.		
60 mins	Begin the base of the map.	Building the base map.	Prior to the session I had prepared a topographic map of the community boundaries. The students then overlapped the LEGO base plates on top of the topographic map, creating grid lines for each base. Then students picked a LEGO base plate to work on and building began. Initially not every student wanted to start building so they organised themselves into three larger groups the builders, brick sorters and legend makers. The builders would work on their chosen base plate building the base map. The sorters were finding the right LEGO bricks for the builders (e.g., if the builders were working on the river then the sorters had to find all the blue bricks). The students working on the legend were making a final	LEGO and topographic map.

			version that was both legible and aesthetically pleasing.	
15 min	Pack-up			

Note. Author's own, 2018.

Session 9- 14: 90-minutes each

Dates: *5th of April, 10th of April, 11th of April, 12th of April, 30th of April, 1st of May, 2018.*

Background: participatory building progresses.

Desired outcome: students continue to build the LEGO map.

Table 17.

Session Nine to Fourteen Outline

Time allocation	Topic	Activity	Activity Explanation	Resources
10 min	Recap and today's agenda.	Group discussion.	At the start of each session students would review their progress so far and self- assign their tasks and responsibilities for the day.	
70 mins	Building the base of the map.	Building the base of the map continues. Students led the process and alternate between different groups: builders, sorters and legend.	Students continued building, sorting and working on the legend.	LEGO.
10 min	Pack-up			

Note. Author's own, 2018.

Session 15: 90-minutes- Friday 4th of May, 2018.

Background: final day of building.

Desired outcome: students will finish plotting community capacities, hazards and vulnerabilities.

Table 18.

Final Building Session

Time allocation	Topic	Activity	Activity Explanation	Resources
10 min	Recap and today's agenda.	Group discussion.		

60 mins	Final adjustments to the map.	Students review the map.	As a group they discuss and decide whether to add or remove any additional information to the map. For example are the houses in the right spot, or do more trees need to be added to a certain area.	LEGO.
10mins	Certificates.		Each student was given a certificate of appreciation for their involvement in the project.	Certificates
10 min	Pack-up			

Note. Author's own, 2018.

Session 16: 60-minutes- Tuesday 5th of June, 2018.

Background: a focus group with the three teachers was set up as an opportunity for the teachers to provide formal feedback. A focus group was chosen rather than one on one interviews due to time constraints. The school principal was invited to the focus group however declined joining as he thought the three teachers who were actively involved in the planning and development of the project would be able to provide more thorough feedback.

Outcome: the aim was to reflect upon the process with the three teachers involved in implementing the project and get an understanding of what they considered strengths and limitations and whether they believed the project is replicable in other schools.

Table 19.

Teacher's Reflection Focus Group Outline

Time allocation	Topic	Activity
5 min	Introduction and welcomes.	Group discussion. Re-cap of what we did and what the purpose of today's focus group.
45 mins	Reflection	Questions: Overall what were your thoughts about the project? What were the weaknesses you could identify during the process? What were the strengths you could identify during the process? Do you think this is replicable in other schools?

		What would you tell other teachers about the project? How might you wish to use the map moving forward?
10 min	Concluding thoughts	Final feedback about the overall project.

Note. Author's own, 2018.

***Session 17: 70-minutes- Wednesday 4th of July, 2018*.**

Background: This focus group was to provide an opportunity for the children to feedback and reflect on the project.

Desired outcome: To get an understanding of the children's thoughts about what they considered strengths and limitations of the process and what were the challenges or opportunities that arose.

Table 20.

Student's Reflection Focus Group Outline

Time allocation	Topic	Activity	Resources
15 min	Introduction and welcomes.	Group discussion. Re-cap of what we did and what the purpose of today's session is.	Dictaphone, pen and notebook.
30 mins	Strengths, Needs, Opportunities and Challenges [SNOC]	Carousel: Station one: strengths of the project Station two: needs / weaknesses of the project Station three: opportunities to improve the project Station four: challenges that arose during the project	Pens, flip charts, timer, Dictaphone and notebook.
20 mins	SNOC Group discussion	As a group we debriefed and discussed our answers. Then the students were given stickers to rank their answers from 1 to 5. With the answer they agreed with the most getting five stickers and the answer they least agreed with getting one sticker. This ranking exercise was designed to spark debate within the group and get them to collaboratively discuss and explain their reasoning for prioritising one answer over the other.	Flip charts, stickers.

Note. Author's own, 2018.

3.4.1 *Making Sense of the Information: Data Analysis and management*

Discussions from each session, during phase one and two was audio recorded and transcribed. The knowledge produced, and discussion had amongst the students and with myself was analysed using thematic analysis. Thematic analysis is a common method of data analysis when conducting qualitative research (Braun & Clarke, 2006). Thematic analysis explores common themes that emerge from focus groups or discussions to build upon a theory to help explain phenomena (Ross, 2012). Thematic analysis goes beyond counting words or phrases but strives to draw attention to ideas or themes within the data (Guest., MacQueen., & Namey, 2012). A crucial step in making sense of the information was my own field notes that I took during and after each session. To create an efficient and intelligible system I organised my notes into the following categories:

Table 21

Researcher's Field Notes Analysis

Facilitator/ Researcher field notes:
1. Session number and date
2. Length of session
3. What activities worked during the session
4. What activities did not work during the session
5. Themes and ideas that became apparent during the session
6. My own self-reflection

Note. Author's own, 2018.

However, because the design of this study is also a participatory research method it is noted that the thematic analysis was done in collaboration with students. This was achieved through relaying themes and sub-themes back to the children at the start of each new session and allowing them to dialogue and re-frame the themes extracted. This was to ensure that the participatory research was continuous, and the students had control over the research agenda, the process and information generated.

As discussed earlier a common critique of participatory research is that participatory methods require group consensus which result in dominant opinions (Cooke & Kothari, 2001). Another argument made by academics is that child-centred approaches in research are frequently driven by an adult agenda (Mitchell et al., 2009), this in turn influencing the knowledge produced. Therefore, I wanted to ensure the entire research process provided opportunities for the students to refute or explain further on themes that I had pulled out from my researcher, facilitator and adult perspectives. This step was crucial in ensuring that the study holds true to the research methodology and ensures the children had control over the research agenda, the process and information being collected.

The LEGO map built is another component of the data management. The map itself is being stored by the school in the library. The school library provides a safe and secure place for the map, that can also be accessed by all students and the wider community. The completed map is in the care of the school community and is up to the community to utilize the map ongoing. It is intended that the map be used by the school community, in a way that will benefit them, for example as an interactive teaching tool.

3.5 *Conclusion:*

Throughout this chapter the methodology and rationale behind using participatory ethnography has been outlined. This chapter described the methods and tools used to enable dialogue and encourage participation. Around the world, new opportunities are constantly emerging for children and communities to engage in policy, research and decision making (Gaventa, 2006). A variety of participatory tools were used throughout this thesis such as one-word activities, carousels and participatory mapping with LEGO. Phase one of my research method had two main objectives: to build trust and rapport with the children and start a dialogue about past hazardous events and discuss what and who was affected. This in turn would mean that when students broke out into their smaller 'project technology groups' (for phase two of the field work) they were empowered by their own knowledge and were ready to start mapping. While the rationale behind using LEGO was to engage children in DRR in a fun and creative way and produce tangible knowledge it was also an enjoyable experience as both a researcher, facilitator and adult. However, like any method, it takes trials and errors to reflect and correct for the next time. The method of participatory mapping using LEGO was a novel idea, that had never been done before in the world. Over the course of chapter four and five I will dive further into my research findings and discuss the strengths and limitations of LEGO as a participatory mapping tool in DRR.

Chapter Four: Research Findings

4.0 Introduction and chapter layout:

The purpose of this thesis is to examine the effectiveness of LEGO mapping in fostering children's participation in DRR. The method used is more commonly referred to as P3DM, a participatory tool which was defined in chapter one and two. 'Participatory' in P3DM does not relate specifically to the making of the map, alone (Gaillard & Cadag, 2013). But rather participation is an ongoing process. The map should be a mechanism in which ongoing and continuous participation is leveraged off to create dialogue with outside stakeholders regarding DRR within that community (Rambaldi, 2010; Gaillard et al., 2015). P3DM can be used for either quantitative or qualitative data (Chambers, 2003). For example, quantifiable data can be produced by community members defining their indicators such as the number of areas a community is vulnerable to flooding. While qualitative data is produced from the annotations made about the map, participant interviews and facilitator field notes. The qualitative data produced throughout this research process is the findings that will be written about and discussed in detail. This is because my research hypothesis is testing the effectiveness of LEGO as a tool that fosters participation in DRR rather than the actual map itself. However, the building of the map is an integral part of my research findings as it helped foster dialogue and participation.

The purpose of chapter four it to detail the findings from my field work. To answer my research hypothesis, this thesis set out to investigate the following research objectives: (1). assess the strengths and limitations of LEGO, as a participatory mapping tool, with children (2). evaluate the role of LEGO, in producing children's knowledge about disaster risk within their community (3). determine the best practice of using LEGO to increase children's participation in DRR activities. To address these research objectives this chapter is organised into four main sections. Section one will outline the preliminary considerations which should be kept in mind when reviewing the research field work. Section two will outline the strengths and limitations of the process of LEGO as a participatory mapping tool. Because the research methodology is participatory ethnography, the findings will be relayed firstly from the children's and teacher's perspectives, then followed by my own insights and findings as a research, and facilitator. This is to ensure that the findings are in align with the ethos and essences of the research methodology. Section three will outline the findings of the role of LEGO in producing children's knowledge about DRR, and the outcome of participation with insight from the children, teachers and my own researcher insight. Finally, section four will summarise the research findings

4.1 *Preliminary considerations:*

This research ultimately seeks to close the gap between 'insiders' (e.g., children, schools and local communities) and 'outsiders' (e.g., researchers, practitioners and policy makers) within DRR, using LEGO as a P3DM tool. However, it must also be noted that the participatory activities that took place in phase one of the field work undoubtedly influenced the results found in phase two. Therefore, the findings from the participatory mapping should not be looked at as a standalone process. But rather the findings should be considered as part of a wider process, where the participatory activities leading up to the mapping helped build trust and rapport between the students and myself. As outlined in the literature review and methodology chapters participation is an intricate process and concept, that moves along a continuum. So, while the focus of this thesis is on LEGO and its effectiveness to foster child participation in DRR, I do believe the activities during phase one influenced the level of participation, detail of dialogue, as well as what the students would map in phase two of the field work.

Figure 4.1. Session Three of Phase One where children begin plotting hazards, capacities, vulnerabilities and identify community boundaries on A1 aerial photo of district. Author's own, 14 March, 2018.

4.2 "The cool thing about using LEGO is": strengths of the process

Below in Figure 4.2 is the list of strengths identified by the students about the process. Following this Figure, I have organised these strengths in their descending order, with a comparison of strengths identified by myself as the researcher and facilitator (in Table 22 below). The image has deliberately been left unorganised to illustrate the nature of participatory work and the process of taking raw data (from Figure 4.2) and transforming it into something understandable to outsiders (in Table 22). The names of the students used in this section have been changed so all findings remain anonymous to the reader.

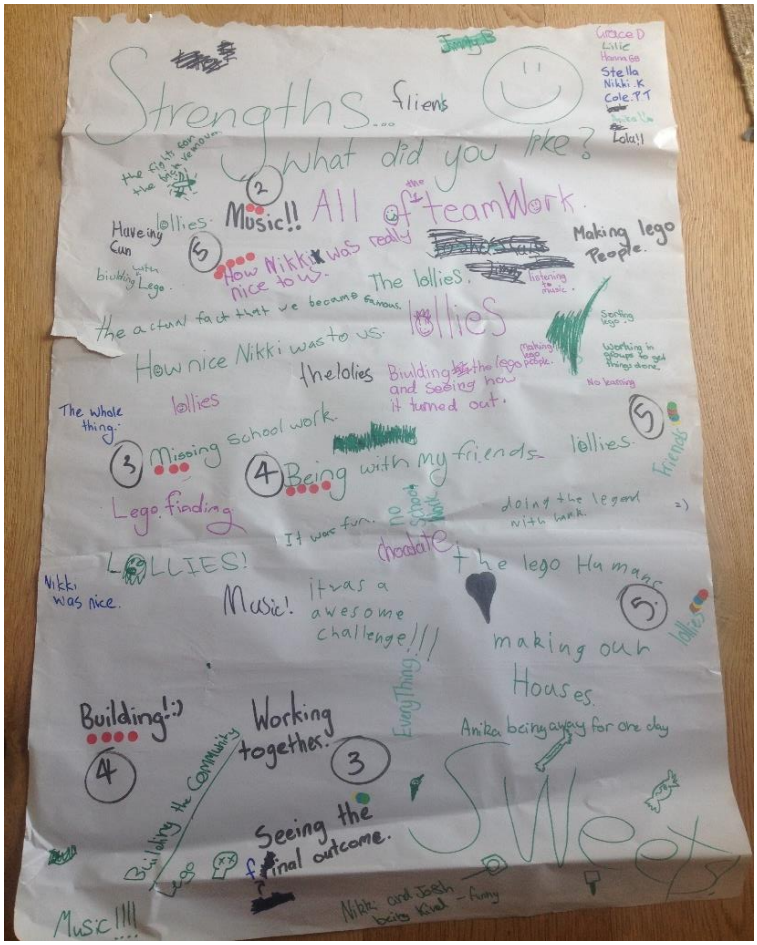

Figure 4.2. Strengths of the process of using LEGO identified by students. Author's own, 4 July, 2018.

Table 22.

Strength and using LEGO identified by Student's

Strengths identified by children, ranked in descending order.	Strengths of the process of using LEGO, identified by author.
• 5 Stickers: 'working with friends' and 'being able to play with LEGO which is something we have at home'; • 4 Stickers: 'being able to build the community with my friends'; • 3 Stickers: 'seeing the final outcome & missing school work'; • 2 Stickers: 'able to listen to music and work'; • 1 Sticker: 'making our LEGO people'.	• All 13 students involved in the process had experience with LEGO prior to project; • Students experience made them 'experts' using the tool, and they took ownership of the process; • Students of all abilities within the group could participate in the building process; • LEGO held their interest and kept them engaged throughout the entire process; • LEGO was effective in engaging both male and female students.

Note. Author's own, 2018.

4.2.1 Five Stickers: the power of play

As highlighted above in Table 22 for the students the main strengths revolved predominantly around the process of building the map. With three out of the five strengths being concerned with the journey leading up to the finished product. The students reported that they enjoyed the process because they "got to play with LEGO with my friends." (Lauren, aged 10). This concept of 'play' is a critical component of active participation as play cannot exist without participation. As defined earlier in chapter two play is to "engage in an activity for enjoyment" (Oxford Dictionary, 2018). The fact that the students themselves described the process as 'playing' with LEGO highlighted a major strength of LEGO, which is that active participation was not only given but it was also an enjoyable experience for the participants. This ensured that participation was voluntary, and participation did not become a burden to the students. As Stevie (aged 11) reflects on both why she chose to participate and how the process was enjoyable for her:

> *"LEGO was my first choice on the list, because I like playing with LEGO so I thought this would be fun. Then my favourite thing about being in the LEGO group has just being able to play with my friends and create our community."*

For the students playing with their friends, building their community and being able to listen to music were important aspects which in turn fostered their participation. The students reported these aspects as enjoyable because they also felt like they were "missing out on school work". The environment created felt different to a normal classroom setting, where historically the structure is more formal with a clear hierarchy between the adult (teacher) and the student (child). As James (aged 11) states that:

> *"All of us are very happy playing together because we are all friends. Also what I have enjoyed over the project is Nikki's being very encouraging to us and let's us move about to another group if we have finished and another group needs help finishing something else."*

The students ranked "working with friends" and "being able to play with LEGO which is something we have at home" as the greatest strengths of the entire process. When trying to get the students to prioritise one over the other, they viewed the two strengths of equal importance. This reiterates the complexity of participation and how several aspects of the process correlate and encourage participation. For the students being able to work with their friends in an informal and flexible structure and with a tool they already had experience with seemed to compliment one another. While it became clear that LEGO indeed play a critical role in initially fostering their interest and participation their ongoing participation was influenced at times by the other aspects of the process, for example being able to play with their friends.

4.2.2 Familiarity: "Everyone knows LEGO"

As described above the first equal strength identified by the students was 'being able to play with LEGO which is something we have at home'. The second part of this comment highlights the aspect that LEGO is something that is rooted into their everyday life. Prior to the field work commencing all 13 students reported having had previous experience with LEGO before my arrival. It was for this reason that LEGO was the chosen participatory mapping tool. LEGO was not only expected to foster participation because it was relevant to their everyday lives, but the students experience and knowledge of LEGO also made them the 'experts' through their recent experience of the tool. As Lucy (aged 10) comments on her reason for participating was:

> "*I choose LEGO because I have lots of LEGO at home but I never really knew what to do with it. But my favourite thing was probably just building our community and playing with LEGO with my friends."*

LEGO is a symbol of childhood within many western cultures and within this specific setting it proved to be culturally appropriate. As one of the students James (aged 11) remarked that "everyone knows LEGO otherwise you had no childhood". A strength of trialling LEGO as a participatory mapping tool in a high-decile rural school in New Zealand was that it sparked immediate interest with the students. This familiarity with LEGO added value in two ways. Firstly, all students volunteered to be a part of the project because they were familiar with LEGO and had fond associations with it as a toy. Secondly the students experience with LEGO made them the 'experts' throughout the process as they had more recent experience than the facilitator (myself) with LEGO.

The student's familiarity with LEGO resulted in a child-led process where they felt comfortable stepping into a leadership role. This leadership role was both in the logistics of the build and in turn the knowledge produced. As Jason (aged 12) states:

> "*I worked on the legend and I liked that as I got to make my own choices, like it was my idea to write out the words on the legend using LEGO bricks instead of using paper. I guess I have a lot of LEGO at home so it was easy to work out how to make the best combinations with the bricks. Then when we finished the legend I helped putting the houses on the hills and helped with the roads."*

*Figure 4.3. S*tudents working on the Legend. Author's own, 4th April 2018.

4.2.3 Accessible to children of different: backgrounds, age, gender and ability

Another reoccurring theme that became apparent was that participation did not require 'expert' knowledge or any preliminary requirements. While every student in the research sample reported having previous experience with LEGO prior to the project commencing, there was varying experience and ability within the group. This became apparent for example, when the group got to more difficult stages in the build such as working on the elevation of the hills. However, this experience instead empowered some students to take on a leadership position within the group in order to help their peers and provide advice on any challenges that arose. At stages throughout the build this did mean that there was an imbalance of power amongst the group. Therefore, it was my role as the facilitator to ensure students reflected and there were opportunities for those students with less experience to refute or debate the actions taken.

As a participatory mapping tool LEGO provided a platform which inspired creativity and play amongst the group. Because LEGO is meant to be put together and pulled apart it also meant students of less experience or of different abilities felt comfortable making mistakes. For example, they could problem solve or easily reconstruct a certain area on the map until reaching a group consensus. LEGO not only empowered some students to take on a leadership role, but also encouraged other students to take more risks and actively participate. In this light LEGO was accessible to all students of all levels of experience and ability within the group. The students also reported a sense of pride from being able to problem solve amongst themselves when overcoming any challenges, they faced during the process. As Tane (aged 12) comments during his interview with a fellow student that:

> "*I really liked making the mountains cause it took oh sorry is taking a lot of work and lots of thinking. And it was cool once we worked out a way to do it ourselves, and now I think the mountains look cool as!"*

LEGO was also effective in ensuring that it engaged with both male and female students within the group equally. LEGO appeared gender neutral in the setting of a rural New Zealand community and was transferrable to both the female and male students in the group. Not only was it effective in engaging with both male and female students but it provided a platform for myself as a facilitator to engage equally with both genders. For example, during phase one of the field work the female students seemed more comfortable approaching me with questions, discussing ideas and providing feedback, while the male students were more hesitant. However, when the LEGO was introduced, I noticed a shift of increased participation with the male students in the group. LEGO appeared to have given each student a purpose by building the map. This in turn perhaps made male students feel more comfortable interacting with me. When the building began the male students began to engage with me and seemed more comfortable discussing or showing their ideas to me through the interactive process of playing with LEGO.

The fact that LEGO is visual, interactive and requires imagination over any literacy or numeracy skills makes it accessible to a wide range of age groups. For the age range of 10- 12 year olds, LEGO was effective at encouraging participation. For the younger students within the wider school community (under 10 years of age) LEGO certainly sparked interest and enthusiasm. However, the age range of the group is still something that needs to be carefully considered when trialling LEGO as a tool to foster participation within children. As a child is defined as anyone under the age of 18 years, LEGO might hinder participation in certain age groups. For example, for children aged 14 years or older LEGO might be perceived as 'childish' while for 0-4 years of age it might require fine motor skills that have not developed yet.

*Figure 4.4***.** Students working on their map. Author's own, 2018.

4.3 "The hard thing about using LEGO is": limitations of the process

While LEGO was effective in capturing and engaging the student's interest and participation, the tool itself posed many challenges. A strength of LEGO was the use of LEGO itself, a toy that every student was familiar with and had previous experience with. The tool was personal to their everyday setting as well as interactive, creative and dynamic. The students enjoyed being able to create their community with their friends making the experience more enjoyable. They were able to produce a tangible and three-dimensional representation of their community as they perceived it. This in turn resulted in voluntary and active participation. However, working with the LEGO brick and working intensely with their friends were also two of the greatest challenges and limitations identified by the children. The children expressed these limitations during their interviews, student reflection workshop and to me throughout the process. These limitations identified by the students are reflected below in Figure 4.5. This has been left unorganised and messy to illustrate the interactive process of participatory research. Following Figure 4.5 I have summarised these limitations in Table 23. In this table is a comparison of limitations identified by the students, using the *ranking* exercise and then by me from my facilitator and researcher perspective.

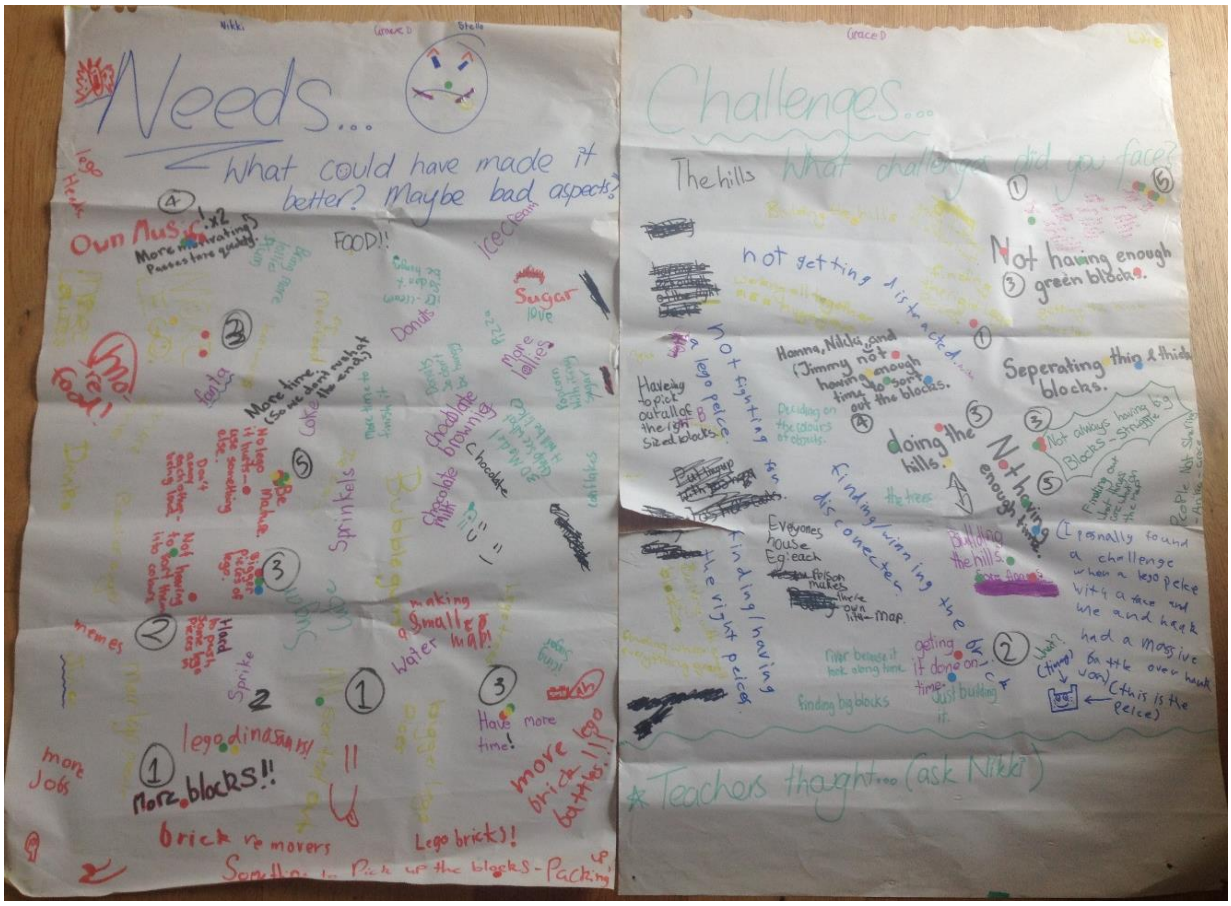

Figure 4.5. Limitations of using LEGO identified by students. Author's own, 4 July, 2018.

Table 23.

Comparison of limitations of using LEGO identified by students and by the author

Limitations identified by children, ranked in descending order.	Limitation of the process of using LEGO, identified by author.
• 5 Stickers: 'when the group is too excited and loud, and we can't agree'; • 4 Stickers: 'not having enough time to make the map look exactly how we wanted it to look'; • 3 Stickers: 'building the hills and not always having enough green or big bricks to work with'; • 2 Stickers: 'not having LEGO houses or trees to make the map look more realistic'; • 1 Sticker: 'LEGO hurts your fingers'.	• The base of the map was time consuming when working within a set time frame; • For younger (0-7 years) or youth (13 years or older) LEGO would not be age appropriate; • High amount of bricks required not always financially viable; • Settling on a user friendly and workable scale; • Elevation and contours do not appear realistic due to the inflexibility and shape of the brick.

Note. Author's own, 2018.

4.3.1 Inflexibility of the LEGO brick: shape, size and colour

As outlined above in Table 23 many of the limitations of LEGO for the students and from my own researcher and facilitator perspective were focused on the technical aspects of LEGO. While these technical aspects might seem far removed from the greater concepts within this thesis such as *participation, two-way dialogue* and *producing children's knowledge* they in fact had a greater impact on the research findings than I anticipated. The idea of LEGO and the novelty of building a three-dimensional map of their community caught the immediate interest of the students. However, the students and I came to realise that the inflexibility of the LEGO bricks would pose as the biggest challenge. The students would often remark on the hurdles faced throughout the building process in terms of the size, shape and colour of the LEGO bricks. For example, Cory (aged 12) explains during the final reflection session that:

> "*I haven't enjoyed working with all the small little pieces that we had to work with because it meant it took longer than it needed to. Also we ran out of the big green bits of LEGO quite fast, so we decide to use the other colours we had heaps of in the middle of the hills then covered the outside of the hills with green bricks. But by the end there were lots of tiny pieces of green bricks we had to work with."*

While this is a technical limitation of LEGO it also meant at times particularly towards the end of the build the students' motivation and enthusiasm to participate had dwindled. The technical limitations of LEGO became an important aspect for the students and to some degree a focus of frustration. These limitations in turn took away from the focus and purpose of the exercise. As Rambaldi (2010) states that the 'participatory' in P3DM should not relate solely to the participation during the building process but participation should be continuous and ongoing after the map is built. This in conjunction with group dynamics became a challenge for the students at times. For example, when students would disagree about how they would overcome the technical challenges faced such as having limited green bricks to work with. However, as Cory states above the group decided collectively to use the coloured bricks, they had ample of to fill the inside of the elevation and only use the green bricks on the outer layer (as displayed below in Figure 4.6).

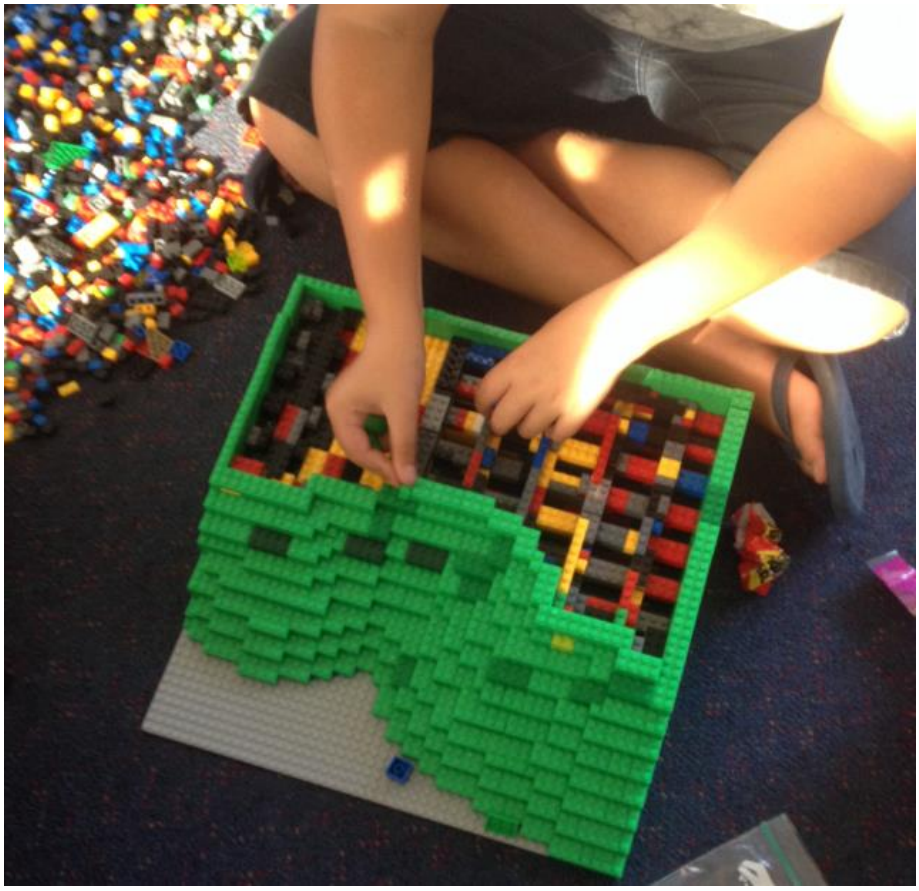

Figure 4.6. Student problem solving by using coloured bricks on the inside of the hill. Author's own, 2018.

The inflexibility of the LEGO brick in terms of its shape brought with it an added limitation when building a three-dimensional map of a rural community with varying levels of elevation. This became apparent at the end when the students began to critique the map in terms of how realistic it looked. This also highlighted the importance of the final product for the children, which goes against the intention of undergoing participatory research. The students reflected on the limitation of the shape of the brick which made it difficult to recreate realistic contours in the landscape and the curves of the hills. Ensuring the map looked realistic and true to their setting was important to the students. Jason (aged 12) states:

> "*When we finished the legend I helped putting the houses on the hills and helped with the roads. But what I wasn't that happy with the hills because the bricks aren't round, and they don't look exactly like the hills, so if you look at those hills there they don't look like the map."*

The technical limitations identified by the students are important to consider from a researcher and facilitator perspective as they might affect the student's ongoing participation. For example, if the students are not proud of the final map and how it looks (in terms of it looking realistic) this could influence the student's willingness to use the map as a platform to engage in dialogue with outsider stakeholders.

Figure 4.7. Students completed map of Maraekakaho on display in school library. Author's own, 2018.

4.3.2 "We were running out of time":

Many of the limitations identified by the students were also limitations that I had identified throughout my field notes. The students ranked 'not having enough time to make the map look exactly how we wanted it to look' at the second biggest limitation of the process. It was not until the end of the field work that it become apparent that these technical limitations faced took away from the overall purpose of using LEGO as a P3DM tool to engage children in DRR. For example, the fact that building the base of the map was more time-consuming than originally anticipated meant this cut into the time allocated at the end to plot hazards, vulnerabilities, capacities and discuss the social dimension of the map. However, for the students they were primarily concerned with the aesthetics of the map, while as a researcher I was concerned with the level of detail and dialogue we were able to go into about the map. As Stevie (aged 11) remarks during her self-reflection that:

> "*The biggest challenge was definitely building the hills. They took ages and ages and we didn't always have enough big pieces to build with and not enough green pieces and then at the end it was stressful because we were running out of time and I was worried we wouldn't get it done. Then the last bit of the hills looks really rushed and not that good."*

These practical limitations faced during the build (such as not having enough big LEGO bricks to build with) impacted on the time available at the end to create a deeper dialogue around disaster preparedness and risk assessment. The purpose of creating a three-dimensional map is that in the end the community has a visual and three-dimensional representation of their community. This map should then be used ongoing for risk assessment and provide a platform for the community to advocate for their needs with outside stakeholders (e.g., policy makers, government agencies and scientists).

While P3DM is a participatory mapping method where community members extract topographic information (e.g., contours and elevation) from scale maps to create a physical and miniature model of local people's communities (Rambaldi, 2010) it should also attempt to make visible the association between the land and the people (IFAD, 2009). By including information such as people's vulnerabilities in relation to the land or people's and household capacities within a community. Due to the time-consuming process of the build because of the: size, shape and colour of the bricks this meant we ran out of time to discuss the social dimensions of the map in greater detail. From my facilitator perspective I was also concerned at how time-consuming the map making process was taking and whether this would create frustration amongst the teachers if I were to cut into additional teaching time. While the school community and teachers were supportive and flexible, by providing additional sessions this might not always be applicable or practical within other communities.

4.4 *The End Result: Producing children's knowledge*

The finished map itself is the most obvious and tangible piece of knowledge produced from the participatory process. However, when reflecting on the final outcomes of the participatory process four main themes became apparent in terms of the strengths and limitations from the outcome of producing student's knowledge with LEGO. These themes have been organised below in table 4.3 and will be further discussed in the chapter.

Table 24.

Comparison of strengths and limitations of using LEGO identified by students and author

Strengths of the participatory process of using LEGO	Limitations of the participatory process of using LEGO
• The finished map is a colourful, creative and tangible representation of students' knowledge; • Students were put into a leadership role within the school and became advocates of their community needs; • Students displayed their capacities to conduct risk assessment through the dialogue and annotations about the map; • By the end of the building process the group had built stronger networks amongst themselves through their shared experience.	• The focus of participation became about the building of the map rather than the ongoing participation within the community; • The accuracy of the scale and visual representation means it would be difficult to upload the map onto a geographic information system for ongoing dialogue or action in DRR; • Unless a student champion or the wider school community led the ongoing use of the map then ongoing and sustainable participation is not realistic; • The finished map visually showed that some students houses were not on the map and due to size and scale there are limitations on a practical geographical boundary.

Note. Author's own, 2018.

4.4.1 Strengths: colourful, creative and tangible knowledge:

The students themselves identified that 'seeing the final outcome' was an important aspect of the entire process. This idea of 'seeing the final outcome' was continuously brought up throughout the building process for example Lula (aged 11) comments:

> *"My favourite thing so far has just been building LEGO, cause it's cool looking at the map as it comes together".*

For the students there was gratification gained from watching the map evolve and their curiosity to see the final product also encouraged their active participation throughout the process. This progression also helped build their trust with me as a researcher, facilitator and guest of the community. As they saw the map evolve and then finally the completed product the students remarked proudly on different aspects of the map for example Greer (aged 11) comments:

> *"I'm really happy with how the river looks and it was also our idea to put the rocks around the river so it looked realistic".*

It was also at the end of the build, where the students could reflect on the map and have a deeper discussion around risk assessment. For example, the river became a focal point for debate amongst the students. This was predominantly in relation to the high flood zones and in turn which households were affected. The rural setting of Maraekakaho being a community where many of the students are from households who work within the agriculture or horticulture industry (such as orchards, vineyards or on sheep and beef farms) influenced the discussion. The students often reported on the importance of the surrounding hillside, in preparing for natural hazards. For example, Jennifer (aged 12) states that:

> *"The farmers are affected like if a flood happens or in the summer time when there is a drought because the animals food is affected and that's how some people make their money. So people watch the news so they know what weather is coming and they can prepare. They can put the sheep up on the hills so they are safe."*

The focus for the students in terms of natural hazards was predominantly from an agriculture perspective and how preparing for natural hazards was important to reduce the impacts on household income. This is also depicted on the map with students highlighting the high flood zones and evacuation zones up on the high land, where animal or stock are to be evacuated to. The outcome from trialling LEGO as a P3DM tool is the map itself. The map provides a visual representation of the student's knowledge and understanding of their community. The finished map (displayed below in figure 4.5) is 190cm x 114cm and represents an area of 3.12km x 1.92km of the Maraekakaho district. This was the community boundaries identified by the 13 children involved.

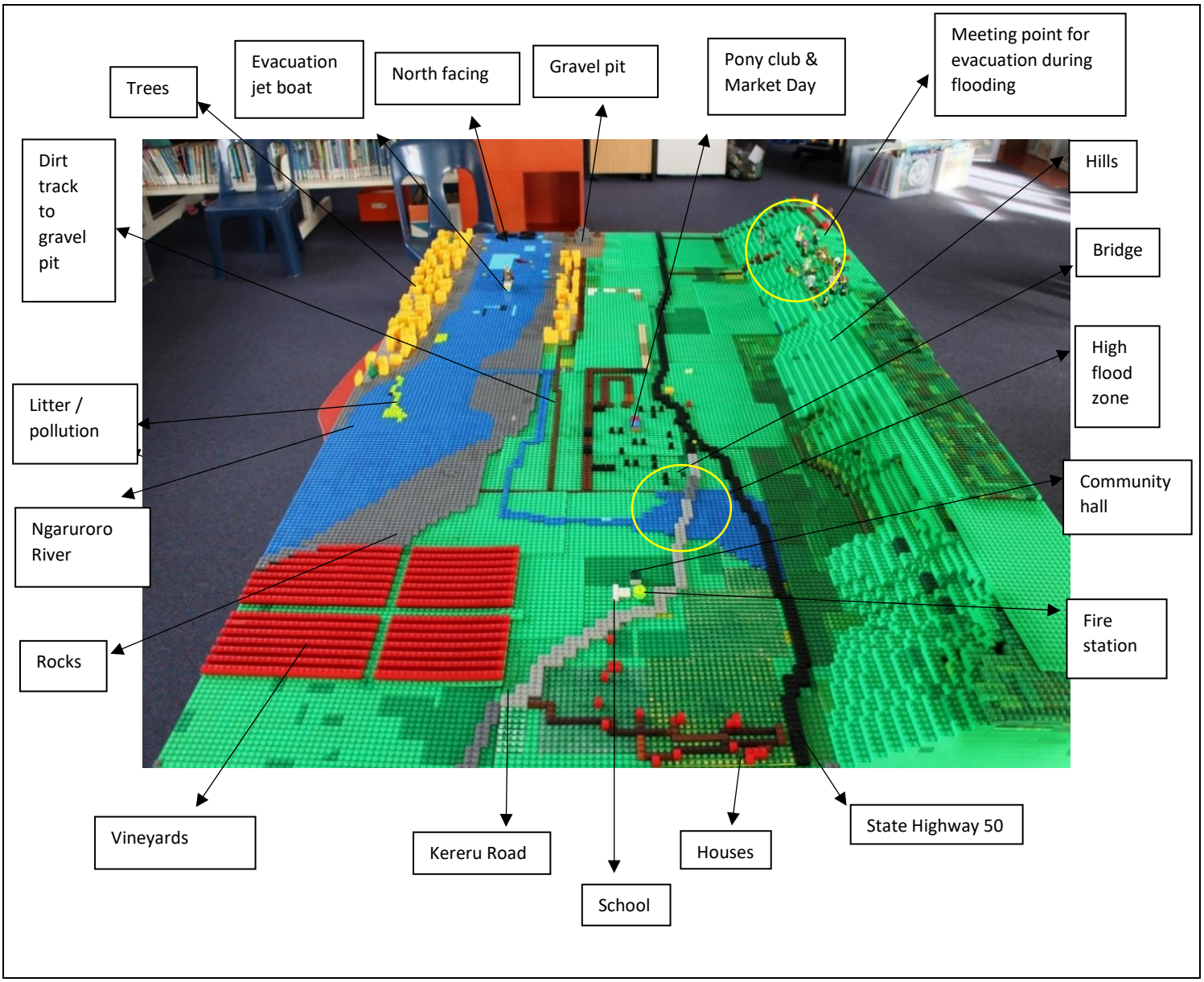

Figure 4.8 The students completed map of Maraekakaho with description. Author's own, 2018.

4.4.2. Student champions: trials and tribulations

One of the advantages of P3DM compared to other visual and interactive mapping methods, is that the method adds the vertical dimension (elevation and hills). P3DM also uses simple colours and shapes to illustrate different aspects of a map (Rambaldi, 2010; Joshi., Dangol., Barjracharya., Murthy. & Wesselman, 2016). As shown above in Figure 4.8 the outcome is a three-dimensional model that can easily be interpreted by both the participants and outside stakeholders. While active participation is required for the construction of the map, P3DM can also serve as an interactive platform for ongoing discussion, decision making and as a learning tool (Joshi et al., 2016; Rambaldi, 2010). The above map is now in the care of the school community, and it is up to the school to utilize the map ongoing, in a way that will benefit them. For example, as an interactive teaching tool or as a platform to enable dialogue with local practitioners e.g., civil defence and local council representatives.

In the conceptual framework that informed this research design P3DM using LEGO was expected to create a platform for inclusive and ongoing dialogue between children and outside stakeholders e.g.,

local practitioners, local council and adults. While attempts were made to connect the disconnect between children and local practitioners, what LEGO was not able to achieve was provide local practitioners with the resource of time to listen. The ongoing participation of students and the ongoing use of the map poses its own set of challenges both from the participation of children and local practitioners. These challenges and findings move beyond the scope of this thesis but will be discussed in further detail in the following discussions chapter.

Throughout the building process, as discussed earlier the students recent experience with LEGO placed them in a position of power. This in turn resulted in student leadership and autonomous decision making when it came to how they were to overcome the challenges faced throughout the build. The student's leadership displayed their ability and capacities to conduct their own risk assessment through group discussion around the map. The school community was at large supportive of the student's participation and leadership. As displayed below in Figure 4.9 the 13 students involved in the process presented the map and at the end of term assembly to the wider school community, teachers and guardians. However, trying to create sustainable and ongoing leadership proved to be difficult. A limitation identified from the process of participation was that unless a student champion was willing to lead the ongoing use of the map then sustainable participation was not realistic.

Figure 4.9 The 13 presenting their map and findings to other students, teachers, parents and guardians at the end of term assembly. Author's own, 2018.

4.5 From the teachers' point of view:

To get a deeper understanding of the strengths and limitations of the participatory process, I conducted a focus group with the teachers involved in the project. Below are quotes and statements taken from this focus group and are the views and opinions of those teachers involved. In keeping with the essence of participatory ethnography research I have first taken direct quotes from the

teachers. Following these statements, I have my own interpretations of these concepts. Overall all three teachers reported the experience and outcome to be a positive learning experience. They mainly reported back on how relatable the content was to the children's day to day lives and how quick the students were able to make the connection between their environment and the livelihoods of their families and local businesses. With Sean (2018) stating:

> "*Overall it was definitely a positive experience and I think our kids really bought into it quite well and they could relate to it pretty quickly. The vocabulary at the beginning was probably their biggest boundary but once they understood their capacities, vulnerabilities and hazards they could really relate to this within our area. Especially with the mapping exercise that really showed quite a bit of understanding on their behalf so all that pre stuff meant they had a really good foundation leading into the next part when the building begun. They also said stuff and put things on the map that I hadn't thought of like that the river was a capacity not just in the summer for putting out scrub fires but also you could use it to send jet boats down it if the roads were blocked and people needed to get into town or visa-versa."*

Challenges were noted in the teachers focus group around the vocabulary used during phase one of the field work, this point was also an important aspect of my own researcher reflection. The vocabulary used such as capacities, vulnerabilities and hazards are not just terms that are difficult for children to define. These are abstract ideas that are often hard for adults to articulate and contextualise, with each person having their own interpretation of the words. The purpose of building a three-dimensional map is to visually display these concepts such as 'hazards', 'capacities' and 'vulnerabilities' to overcome barriers of participation where historically 'expert' knowledge is required to participate in the research or policy making process. It is important when designing research with communities that the vocabulary used does not alienate or discourage participation to more vulnerable members of a community (e.g., children or the illiterate). As this can result in further inequalities or uneven power dynamics between community members and researchers, government agencies and scientists.

During the teachers' focus group they all remarked on how they enjoyed the experience. However, limitations and challenges were also raised during our discussion. As one teacher Jenna (2018) states:

> *"It was definitely, definitely a positive experience for both us and the kids. I think with the map as well it did make them and us think well where does our community start and finish? I know we had some of our kids feeling perhaps a little left out because their house wasn't on the map as they were from Bridge Pa the neighbouring community, so maybe that's something to think about for a next time perhaps you could have smaller hub maps could be better so students don't feel left out."*

Inclusivity and exclusivity are critical influencers of the level of participation (Sulemana & Ngah, 2013; Farrington & Bebbington, 1993; Cannon, 2008). A limitation which became apparent at the end was the fact that the map did not have every student's household on the map. While the community boundaries were defined earlier in the process, because the map provided a more visual and tangible image of the community it was not until the end that students remarked on this fact. This also raised other limitations of the outcome. Building a three-dimensional LEGO map within a rural setting meant that the scale working with a LEGO brick was inflexible and, in some ways, predetermined. This also meant the finished map was large and we were also limited for space to work and store the map, as the size of the map was larger than what I believe the teachers initially thought it would be. Creating a larger map to include students' households on the map however was not an option. Building a map

of a rural community, meant households were wide spread and we simply did not have the space or time to create a larger map.

4.6 *Conclusion*:

This chapter outlined the strengths and limitations of both the process and outcome of LEGO as a P3DM tool in fostering children's participation in DRR. The results initially showed that LEGO in the context of New Zealand and in a high-decile school sparked immediate interest from the children to participate and enabled active participation throughout the entire process. The tool itself did not require any prerequisites from the students. With all students having had previous experience with the tool it made them the 'experts' over the course of the field work. LEGO as a participatory tool was transferrable amongst the male and female students in the group. These qualities made LEGO as a P3DM tool accessible to all levels of ability for the age group of 10-12 years. However, like any participatory tool LEGO posed its own limitations. Many of the limitations identified by the students revolved around the technical aspects of LEGO such as shape, size, colour, quantity and time. While such aspects seem far removed from the bigger concepts in this thesis such as participation, two-way dialogue and producing knowledge they did in fact have an unexpected domino effect on participation and the purpose of the map. The technical limitations of LEGO need to be considered with more thought for any future research, so they do not become a point of frustration and take away from the greater purpose of the participation.

This chapter provided insight and detail into *what* was found and *what* was initially thought of LEGO as a P3DM tool to foster child participation in DRR. To further examine the effectiveness of LEGO as a P3DM tool in fostering genuine child participation in DRR, the *whys* and *how's* of this question need to be analysed. For example, *why* is play important when designing a method to foster child participation in DRR? Or *how* does LEGO enable dialogue with a wide range of stakeholders? These questions will be discussed in further detail in the following chapter.

Chapter Five: Discussion and Lessons Learnt

5.0 *Chapter outline:*

This chapter will critically reflect on and evaluate the significance of the research findings in the field of DRR. In order to do this, this chapter has been organised into five sections. The first section of the chapter will re-orientate the reader with the conceptual framework that both informed the research design and objectives. The conceptual framework shows the proposed process of weaving together children's participation, dialogue and knowledge using LEGO mapping, in order to create change and action within DRR. It also illustrates why children are dissociated from knowledge and action in the field of DRR, if there are no tools in place that bridge the gap between 'outsiders' (e.g., scientists, researchers, policy makers and practitioners) and 'insiders' (e.g., children, local communities and indigenous groups). Section two of this chapter will critically discuss the opportunities and challenges found from LEGO mapping as a tool to produce children's knowledge. This section will reflect on the current discourse which surrounds children's knowledge, and how children are perceived by practitioners, government agencies, researchers and wider community members in the field of DRR. The third section of this chapter will connect the dots between the challenges faced in the field of DRR with children's participation and the capacities of LEGO in bridging the gap between 'outsiders' and 'insiders' through two-way dialogue. Section four of this chapter will examine the lessons learnt from this research and provide recommendations moving forward. Finally, the fifth section will summarise the chapter.

5.1 *Re-orientating the reader:*

My research hypothesis was testing the use of LEGO as a P3DM mapping tool to engage children in DRR in an interactive and creative way that would produce two outcomes: genuine participation and tangible knowledge. The purpose of testing the use of LEGO mapping with children was to look at practical solutions to include children in DRR. As Gaventa (2006) highlights that participation has become a 'buzz' word in both disaster and social science research, however to date DRR initiatives have predominantly targeted an adult audience. Most of the research on children has focused on children's vulnerabilities or children's trauma in the wake of a disaster (Peek, 2008; Ronoh et al., 2015; Wisner et al., 2018; Wachtendorf et al., 2008). This thesis research goes against the usual rhetoric that children are vulnerable and passive victims of disasters (Peek, 2008; Ronoh et al., 2015; Wisner et al., 2018; Wachtendorf et al., 2008). LEGO mapping with children seeks to deepen our understanding of children's capacities to communicate and contribute meaningful information to the field of DRR.

The origins of the below framework have been adapted from Gaillard and Mercer (2013) road map for integrating and bridging the gap between various stakeholder's knowledge and actions in the field of DRR. Here it is argued that one of the greatest challenges to sustainable DRR solutions, is the power inequities which exist within our communities (Gaillard et al., 2013). These unequal power relationships between community members and 'insider' and 'outsider' stakeholders tend to exacerbate people's vulnerabilities in the face of disasters (Bosher, Penning-Rowsell, & Tapsell, 2005; Gaillard et al., 2013). This framework illustrates that each stakeholder holds their own valuable knowledge about their community, environment and field of expertise and that by integrating this knowledge it will create more sustainable DRR solutions. However, tools are often missing to connect the dots between stakeholders and people's knowledge remains in their various silos (Gaillard & Mercer, 2013). This research does not hold one person's or one stakeholder's knowledge of higher value over another's but recognises that stronger solutions come with holistic and integrated knowledge and understanding (as illustrated again in Figure 5.1).

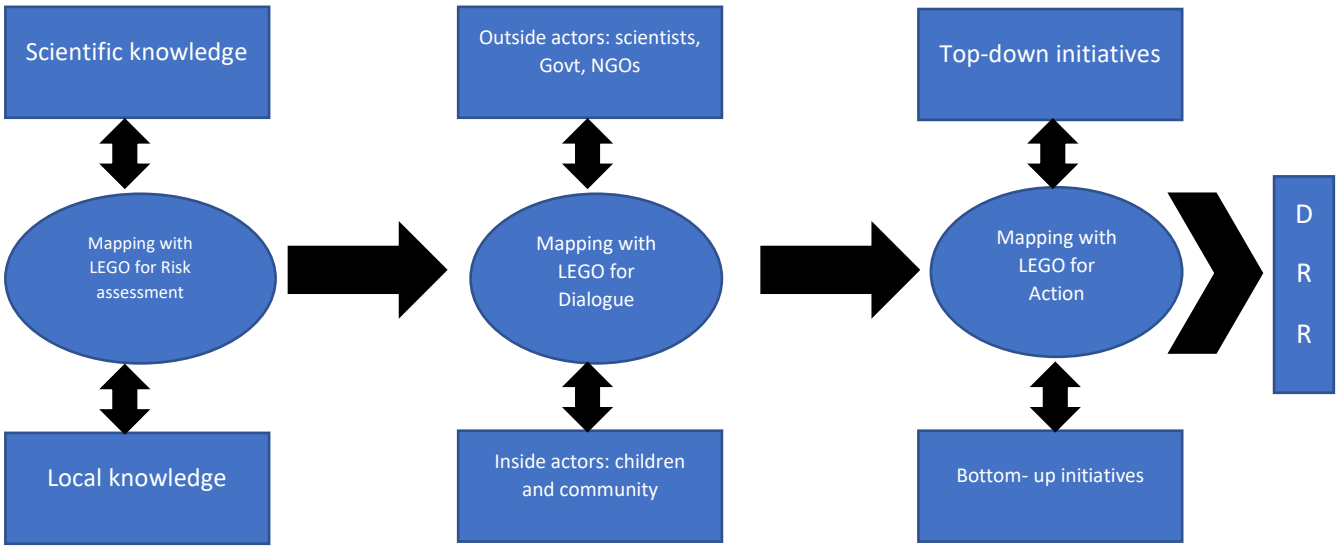

Figure 5.1. Process for integrating knowledge, action and children in DRR with LEGO. Adapted from *Knowledge to action: bridging gaps in DRR* (p93), by J. Gaillard & J. Mercer, 2013. Mercer, 2013.

For a long time, methods of understanding, monitoring or predicting disasters was left in the experts' hands of meteorologists, seismologists and volcanologists (Gaillard, 2010; Heijmans, 2009). This historical approach is 'top-down' or technocratic, based on the transfer of experts' knowledge onto local communities (Cornwall, 2011; Gaillard, 2010 Le De, Gaillard, & Friesen, 2014). However, since the 1970s, technocratic approaches have been the subject of much heated debate, and there has been a greater shift towards collaboration in both research and practice (Gavent, 2006; Cadag et al., 2018; Wisner et al., 2018). Methodological approaches that embody words such as inclusion, participation, co-design and empowerment aim to validate local knowledge (Freire, 1970; Gaventa, 2006; Cadag et al., 2018; Wisner et al., 2018).

The popularity of participatory and inclusive approaches to both research and practice are not exclusive to the field of disaster research, but across a wide array of government and non-government agencies working with communities (Cornwall, 2011; Gaventa, 2006). However, little progress has been made that both encourages participation and produces a platform for ongoing and communicable dialogue between community members, researchers, practitioners and policy makers (Watts & Bohle, 1993; Pretty, 1996; Martin, 2010; Mitchell et al., 2009). Some academics argue that there are limited participatory tools that make knowledge of local people tangible for outsiders which in turn enable action (Pfefferbaum et al., 2014 & Wisner et al., 2018; Gaillard et al.,2013). Even less progress has been made to date with children's participation, particularly in Western cultures. The limited participatory mapping that has been done with children has predominantly been produced in developing nations. This research hypothesised that LEGO mapping could address some of these challenges and bridge the gap between children's knowledge and outside actors such as researchers, local practitioners and government agencies.

5.2 *Mapping Children's Knowledge*

LEGO as a mapping tool was thought to have the ability to map a variety of information about local territory, while fostering children's ongoing participation. My research hypothesis was a novel approach to children's participation in DRR by using LEGO mapping as a tool to raise DRR awareness in a playful manner. LEGO mapping was the chosen P3DM tool, due its popularity amongst Western

children and its ability to interlock into over 915million different combinations. The process used over the course of this thesis was participatory from the moment the community requested external help with DRR solutions to the co-designing of the field work and through to the production of knowledge. Some academics argues that there is a critical difference between participation as an outcome compared to participation as a process (Arnstein, 1969; Hart, 1992; Pretty, 1996 & Gaventa, 2006). In this case it did become apparent that the final outcome of seeing the map was intricately linked to the children's ongoing participation, as the students were curious to see the final outcome. The children also identified some of the outcome components (as outlined in chapter four) as some of the highest ranked strengths of the journey in that LEGO was able to: make students' knowledge visual, colourful, three dimensional all through the process of play.

The process of producing knowledge was an engaging experience for the children and they often described the research journey as 'playing with LEGO'. This idea of play was closely tied to my research design as research shows that there are numerous benefits linked with play, such as play being a facilitator of learning and improved educational outcomes (Reiber, 1996; Granic et al., 2014; Gampbell et al., 2017). Despite the many known benefits of play finding the right tools that both encourage play and produce legible knowledge is difficult terrain to negotiate. In this sense LEGO mapping certainly provided a balanced approach to this problem, through a creative and playful cartography process.

LEGO mapping as a tool within DRR has the potential to be led by the students in a creative way to close the gap between 'insider' (e.g., children) groups and 'outsider' (e.g., researchers and scientists) groups, rather than being another extractive data collection method. LEGO mapping can also quickly illustrate how the student's view their community and their ability to conduct risk assessment. For example, the students focused on the importance of farming households in preparing for floods or droughts to reduce the impact on household income. These findings contradict with the wide spread belief in DRR that children are unable to voice the wider concerns of the community (Martin, 2010; Mitchell et al., 2009). As a result, children are often dissociated and excluded from the production of DRR knowledge. This in turn has resulted in a lag in participatory tools for children to contribute to DRR awareness and decision making (Amri et al., 2017; Gampell et al., 2017; Wisner et al., 2018; Anderson, 2005).

LEGO mapping has the potential to bridge the gap between children's knowledge and scientific knowledge due to its capability to both foster participation and produce communicable knowledge. However, connecting children's knowledge to other stakeholders (e.g., DRR practitioners) and making them interested in children's knowledge is another challenge altogether. Some academics argue that there needs to be a clear distinction between participatory research that is requested by communities and research that is driven by the researcher using participatory tools to engage with a community (Le De et al., 2014). However, what happens when participatory research is undertaken as a request of the community but the practitioners, policy and decision makers within the field do not have the time or resources to listen to the community? Therefore, sometimes it is not always about 'adults' adjusting their attitude to listen. But rather adults and practitioners within the field having the available resource of time to be able to listen and work with communities rather than time just to react to communities needs.

When examining the significance of my research to the wider body of literature I identified the: strengths, weaknesses, opportunities and challenges of LEGO as a participatory tool for children in DRR (outlined in Table 25 below).

Table 25

Strengths, Weaknesses, Opportunities and Challenges Reflection

Strengths: mapping risk & producing knowledge	*Weaknesses: mapping risk & producing knowledge*
• Knowledge is tangible and visual • Useful for wide array of stakeholders • Can easily be updated and changed as the environment evolves	• Requires a lot of building time • Requires large amount of bricks which might not be financially viable • Dependant on experience of facilitators ability to steer the groups focus and results/ knowledge produced
Opportunities: mapping risk & producing knowledge	*Challenges: mapping risk & producing knowledge*
• Provides a platform for collaboration with wide array of stakeholders or other community engagement (outside the area of DRR) • Interactive teaching tool for school to utilise • Reinforces children's capacities and knowledge about their community	• Building the base of the map time consuming: may cut into plotting exercise at the end if working within a set time frame • Map can easily be changed/ altered by external stakeholders if not in a secure place • Can reinforce existing power dynamics within the group if facilitator does not provide equitable process resulting in bias knowledge • Connecting children's knowledge to DRR change and solutions

Note. Author's own, 2018.

Despite the strengths identified from LEGO mapping, the tool itself did pose its own set of challenges mainly in relation to the inflexibility of the bricks: size, shape and colour. While the technical challenges of LEGO mapping might seem far removed from concepts such as participation, risk mapping and knowledge they did have an unexpected influence of student participation, what was and was not mapped and in turn on what knowledge was produced. Literature often refers to this as 'respondent or participant burden', which has traditionally been identified in the field of survey research (Bradburn, 1978). With research design having to consider either the length of an interview, the amount of effort required to participate or the frequency of interviews (Bradburn, 1978; Frankel & Sharp, 1980). These concepts while originally were concerned with adult participation, are transferable when designing research or tools to work with children. If the sessions become too long or boring, then it can hinder participation and participants might lose motivation or momentum. In this sense LEGO as a tool to foster children's participation in DRR still has a few technical challenges to overcome.

Throughout my researcher self-reflection I was also able to identify that while LEGO has many strengths there are also areas of opportunity for improvement. While participatory methods and research is often viewed as being ethical, because of its inclusive philosophy which is to empower the powerless this is very much dependant on the experience of the facilitator/ researcher who guides the

group (Slim, Thomson, Bennett & Cross., 1994). This point was reiterated in the teachers' final focus group as Jenna identifies a limitation of the process being "some of our kids feeling perhaps a little left out because their house wasn't on the map as they were from Bridge Pa the neighbouring community." (Jenna, 2018). When reviewing the wider body of literature this is not an exclusive issue to LEGO and in fact participatory tools are often critiqued in this light as being vulnerable to sources of error if not carefully designed (Gaventa, 2006; Cooke, 2001). Cannon (2008) argues that as researchers we often have an idealised concept of 'community' and forget how power operates at a community level. Communities are in fact places where inequality and oppression are reinforced into our everyday relationships (Cannon, 2008). These imbalances of power are then magnified from our micro to macro-level and become national issues. So, while it can be argued that LEGO is an effective tool to foster child participation and produce more inclusive DRR problem analysis at a community level, the capability and inclusiveness of the tool will heavily rest upon experience and skills of the facilitator (Chamber, 1995; Wisner, 2006).

The challenges identified of participatory approaches are mainly concerned around the dynamics of power in which the participation takes place. However, a limitation I identified was not only around the dynamics of power but also the facilitator's ability to genuinely connect and interact with the children. Anderson (2005) also argues this fact that child's participation within the field of DRR may have lagged because most disaster practitioners or researchers lack specific child health or child development expertise. This in turn has influenced the knowledge both produced in the wider field, but also the knowledge produced or level of participation when working with children. LEGO as a participatory mapping tool appeared to help my facilitation and ability to build trust and rapport particularly amongst the male students within the group. While historically the gender appropriateness of the tools used to engage children in DRR is often ignored, even if the intentions to listen to children are well intentioned by the practitioner or academic. LEGO as a tool has the potential to bridged the gap between children and outside stakeholders through two-way dialogue to take place around the map. What LEGO mapping is not able to do however is necessarily make DRR practitioners or adults listen to the knowledge produced, however this aspect moves beyond the scope of the objectives of this thesis.

5.3 *Connecting the Dots: mapping for two way- dialogue*

When reflecting on my research findings I wanted to understand to what extent did LEGO as a tool enable dialogue with outside stakeholder such as DRR practitioners and the wider family network. While my research took place within a school setting, the research design did not include a specific session where the student's guardians and wider family network were actively involved in the process. In Wisner et al., 2018 literature review on children in DRR, enabling DRR action should include the wider family network for a community conversation to take place. Therefore, in the wake of my field work I wanted to understand if LEGO mapping solely with the children was effective in starting a wider community conversation.

For the convenience of the reader these discussion points have been inserted below into Table 26. In the left column are the themes that arose from my research findings, while on the right column are a comparison of implications of these findings and future discussion points.

Table 26.

LEGO mapping for two-way dialogue and action with family and discussion points

LEGO Mapping for two-way dialogue and action with family network and implications of findings	
Themes:	Discussion points:
• Power of play: participation with children needs to be fun	• Purpose of participation and influence of facilitator/ researcher
• Child-led	• Sustainability and community buy-in
• Accessible to wide variety of stakeholders	• Children and communities are heterogenous

Note. Author's own, 2018.

It is recommended that participatory work done with children should be personal, voluntary, interactive and responsive (Wisner et al., 2018; Clandinnin, Caine, Lessar & Huber, 2016). While other academics recommend that in order to foster child participation the activities should be enjoyable, and play should be at the centre as a facilitator of learning (Reiber, 1996; Granic et al., 2014). These concepts have filtered into the field of DRR with examples of game and play being used by UNISDR with online games such as 'Stop Disasters' being launched (Gampbell et al., 2017). However, creating a tool that is playful, interactive, personal, responsive and voluntary for children that can also engage parents, guardians and the children's wider network is rarely achieved in DRR. P3DM using LEGO has the capacity to bridge this gap, as the LEGO brand is not only popular with children, but people of all ages. However, LEGO's capacities are heavily influenced by the agenda of the researcher and facilitator steering the process. LEGO is also not a 'one stop shop' or a single solution to the plethora of problems faced in DRR. It should however be used in conjunction with a range of tools that complement each other and participation and knowledge is gained from a range of stakeholders. Researchers also hold a responsibility in acknowledging this and should be critical of both the tools they use to foster participation as well as the power which they bring as the researcher undergoing research with children and communities and how they influence dialogue (Gibbs et al.,2013).

Another important aspect when engaging in dialogue with children, is that the communication should not be one-way (Wisner et al., 2018). While this might seem obvious when designing child participatory research, there is a tendency of humanitarian workers and academics to perceive children as passive victims of disaster rather than individuals with capacities and valuable knowledge (Martin, 2010). In Roger Hart's essay on participatory approaches when working with children and youth, he laid out systematic ways of treating children as their own agents of change. In this he argues that child participation challenges personal, cultural and many political values that exist within our societies (Hart, 1992). These social and cultural challenges were also experienced in my field work. For example, when the students requested that we work on the map over the weekend. This child-led and initiated process was halted as we were unable to find another adult volunteer to be present with the students and I outside normal school hours, a requirement of the school policy. While child-participation at large was encouraged by the community, it became apparent that it had a limit and child-participation needed to fit within a certain scope. This in turn can have a negative impact on the

sustainability or level of dialogue the children engage in if they feel the adults do not support or are not enablers of their participation.

In Sherry Arnstein's ladder of participation she is the first to illustrate the different forms of participation which fit into three broader categories: nonparticipation, tokenism and citizen control. Arnstein's ladder of participation remains relevant however, other academics have built on this theory. For example, in Pretty's (1995) typology of participation the concept of participation and their different forms appear from the perspective of the participants, rather than focused on the distribution of power (as re-illustrated below in Table 27).

Table 27

Typology of participation indicating level of participation

Level of Participation	Typology of participation	Features of participation
Low participation  High participation	Manipulative Participation	Participation as a 'token' pretence with no legitimacy or power been given to the chosen representative.
	Passive Participation	People are informed of the decisions that have been made and no genuine opportunity is given to provide feedback or respond to these decisions.
	Participation by Consultation	People are given an opportunity to participate to decision making through consultations, surveys or questionnaires.
	Participation for Material Incentives	People participate by an exchange of resources for example they contribute their ideas or time in exchanges for cash vouchers, food or other material goods.
	Functional participation	External stakeholders encourage participation in order to meet project goals or objectives.
	Interactive participation	People participate alongside to develop plans and projects to strengthen community institutions.
	Self-mobilisation	Community initiated and led, which is completely independent of 'outsiders'.

Note. Adapted from "The many interpretations of participation", by J. Pretty. 1995, *In Focus, 16*, p. 4.

When critically reflecting on the capacities of LEGO as a tool to foster child participation in DRR, as the researcher I would categories the process as sitting between 'functional participation' and 'interactive participation'. In this sense LEGO mapping was functional, as it was initiated by external stakeholders

(myself) in order to meet a project goal or objective (my thesis research). However, the student's participation was also interactive, as the teachers and students developed the lesson plans alongside me as ultimately the adults within the community requested a DRR plan. When evaluating the research findings in comparison to Pretty's typology of participation it highlights the potential LEGO has to evolve into a tool that is self-mobilised by the children and community themselves. However, it is important to note that financial barriers of LEGO may hinder child or community-led participation. As Gaillard et al. (2013) note that traditionally the material used for P3DM are sources from local, cheap materials such as cardboard, paper, Styrofoam, crepe, pushpins or paint. This is done not only for convenience, but it also ensures that if local stakeholders wish to replicate the process or conduct their own mapping they can easily do so (Gaillard et al., 2013).

Another limitation I identified was the replicability of using LEGO as a P3DM tool in other communities. When reflecting on the replicability of using LEGO three main concerns arised: financial viability, the input of researcher/ facilitator knowledge and cultural appropriateness. In the end an estimated 30,000 LEGO bricks were used to build the map. Overall an additional expenditure of $935+GST on LEGO bricks was spent. While this project had external funding to cover the cost of additional bricks required, this resource will not always be available to all researchers or all communities. For example, if a low-decile school wanted to undergo their own LEGO mapping would this be a viable option? In this sense LEGO can limit who and which communities can participate in such an exercise. Furthermore, if the end result is eventually to harness child-led participation (without the input of a researcher or facilitator) does the process require input from a facilitator in explaining the purpose of the map and the different methodological steps involved? While there are 'train the trainer' facilitators who can demonstrate these steps, so communities can lead their own P3DM, the financial practicality of using LEGO undoubtably limits the accessibility of this process to lower-socio economic communities. Therefore, when examining LEGO mapping as a tool to foster sustainable, replicable and child-led participation it does pose financial barriers and may limit who and which communities can participate. LEGO mapping and the community in which it is used in should also be considered carefully, as it might not always be culturally appropriate in a non-Western context.

LEGO was found to be accessible and culturally appropriate within the setting of Maraekakaho a high-decile rural school in New Zealand. Not only did it spark immediate interest with the children, but it was a tool that was transferrable between boys and girls and a variety of abilities and backgrounds within the group. The final product of the map produced illustrates a heterogenous community filled with colour, depth and detail that would be hard to capture in a written report. As Delicado et al (2017) points out that children are heterogeneous and come in a variety of ages, ability, gender, ethnicity, religion, backgrounds, cultures and have their own world views. Therefore, when designing participatory tools to work with children and communities it is important for researchers and facilitators to understand that they are in fact heterogeneous (Zakus & Lysack, 1998). Another consideration for researchers and facilitators is that the tools used should be accessible to a variety of abilities, gender, ages and backgrounds and captures that diversity (Zakus & Lysack, 1998; Arksey and Knight, 1999). LEGO mapping was chosen for these reasons and LEGO mapping displayed its ability to enable children of different backgrounds, gender and age to interact harmoniously through the process of play. The LEGO map also provided a visual perspective of the diversity that exists within the Maraekakaho community, which in theory can be leveraged off for dialogue between a variety of stakeholders. However, understanding if that dialogue can be transformed into action is also a critical aspect of the evaluation process.

To date most of the research that exists or interventions that are published that communicate with children, families and schools are within a post-disaster context to facilitate children's capacities to

effectively cope following a disaster (Wisner et al., 2018; Gibbs et al., 2013). While in Martin's (2010) review of child participation in DRR revealed that most agencies and practitioners approach communities as a homogeneous group, regardless of the varying age, gender, religion and backgrounds. This approach, while well-intentioned tends to reinforce paternalistic views that treat children as an extension of their parents and guardians (Martin, 2010). However, Mitchell et al., (2009) points out that excluding children's knowledge and dialogue from public discourse not only threatens their safety if a disaster occurs, but it also dismisses a valuable resource in developing practical risk reduction activities.

5.4 *Participation for Action: moving forward:*

LEGO mapping was found to address many of the reported challenges faced in the literature around children's participatory tools. These included LEGO mappings ability to foster genuine interest by the children throughout the process as well as produce legible knowledge in a playful manner. Despite the widely accepted notion that participatory research enables marginalised people to communicate their knowledge and priorities, there is still heated debate on how to transform dialogue, knowledge and participation into action (Cornwall & Gaventa, 2006; Twigg, 2004, Chambers, 2008). Some academics argue that this is because children's participation rarely produces dialogue that is communicable to those decision makers (e.g., scientists, practitioners and policy makers) (Chambers, 2008). However, what was found over the course of this research journey was that there are limited opportunities where children's knowledge (even if it is communicable) can truly influence the decision-making process.

Within New Zealand, DRR planning and management is largely upheld by the Sendai Framework 2015-2030 (UN / ISDR). The Sendai Framework 2015-2030 provides a blueprint for the global community on how DRR should be approached, setting out four key priority points. Under priority point four it states that:

> Children and youth are agents of change and should be given the space and modalities to contribute to disaster risk reduction, in accordance with legislation, national practice and educational curricula (UNISDR, 2015. p23).

From the Sendai Framework the New Zealand Ministry of Civil Defence and Emergency Management [MCDEM] has developed the 'National Civil Defence Emergency Management Plan 2015'. In this plan it sets out the arrangements, roles and responsibilities of local and national emergency management agencies within New Zealand. While children and youth are mentioned in this plan, there is no specific action or priority point for children or youth participation in raising DRR in communities.

The national focus in New Zealand with regards to children and youth is improving the coordination and care services for unaccompanied children in the wake of a disaster as well as the dissemination of the national school's resource kit for teachers, '*What's the Plan Stan?*'. '*What's the Plan Stan?*' is a national voluntary resource kit for teachers, students and parents that was distributed to every primary school in New Zealand in 2006 (MCDEM, 2018; Johnson et al., 2015). The aim of the resource kit is to help develop understanding and skills in order to prepare communities for hazardous events such as floods, storms, earthquakes, tsunamis, volcanoes and landslides (MCDEM, 2018). The focus in New Zealand continues to reinforce paternalistic attitudes that are often upheld within our society that children are helpless victims, in need of rescuing. The fact that child-participation is not a priority point within the national DRR plan, results in a lack of political will power to push tools that foster children's participation, like LEGO mapping.

When examining LEGO mapping and its potential to contribute to the field of DRR in New Zealand, it faces many of the same challenges as other participatory and voluntary tools such as '*What's the Plan Stan?*'. Challenges include that DRR awareness is not a compulsory educational outcome within the New Zealand (nor any) national school curricula (UNISDR, 2015). Therefore, the uptake of DRR educational tools is voluntary and up to the discretion of each school (Johnson et al., 2015). One of the most important steps in my entire research journey, was the fact that the community themselves requested assistance for a community DRR strategy. As a result, the wider community alongside the school community was eager to raise DRR awareness, because they saw it to be a beneficial project for their community. In comparison to a 2012 a survey that was conducted by the Ministry of Education [MOE] into the awareness and use of the '*What's the Plan Stan?*' resource found that only 31% of schools had used the resource at some stage since 2006 (MOE, 2012; Johnson et al., 2015). While another 31% of schools had never used the resource at all, and the remining 38% were not aware of its existence (Johnson et al., 2015). Ensuring that DRR strategies align with communities' priorities is critical in their success or failure (Chambers, 1994), the co-designing method taken from this thesis demonstrated to add to the success of the overall project.

DRR strategies should first and foremost be beneficial to communities, by reducing their risk to disasters. As defined earlier a disaster is "a serious disruption to the functioning of a community or society involving widespread human, material, economic or environmental losses" (UNISDR, 2017). Disasters transcend disciplinary boundaries, yet despite this DRR strategies and proposed solutions continue to work in silos within their own disciplines. Throughout this research journey, the methodology of participatory ethnography was used. This meant that community or 'insider' knowledge was highly valued. Moreover, the knowledge of the children was not the only insider knowledge that was valued, but also the knowledge of the teachers. Ensuring that the teachers were involved in the co-designing of the lesson plans was a crucial component of the research journey. This was due to two reasons, firstly the teachers would be a major asset to myself as a facilitator about what activities would and would not work. Secondly, and most importantly the teacher's involvement in the co-designing of the project meant they were more likely to buy-in to the value and need for DRR awareness.

In an ideal situation there would have been a greater overlap with local DRR practitioners and first responders (such as the voluntary fire brigade) over the course of my entire research field work, not just in the founding stages. While LEGO mapping was able to create visual and tangible knowledge which represented the students understanding of their community and community risks, it was not successful in transforming this knowledge into DRR changes or action. A major challenge of participatory research, which was also found to be applicable to LEGO mapping, is transforming the production of knowledge and participation into action (Gaventa & Cornwall, 2006). This is because participation, and particularly children's participation conflicts with many deep-rooted cultural, political and even child rearing norms (Peek, 2008; Twigg, 2004; Gaventa & Cornwall, 2006; Hart, 1992).

Gaventa and Cornwall (2006) in their article *'Challenging the boundaries of the possible: participation, knowledge and power'* discuss three dimensions of participatory research: action, knowledge and consciousness. What Gaventa and Cornwall (2006) articulate is the intricate relationship between knowledge, action and consciousness and how they affect participation. Knowledge here is recognised as a visible power and resource which can affect decision making (Gaventa & Cornwall, 2006). For example, the three-dimensional LEGO map is a visible power of the children's participation. While there are hidden powers behind action such as who was involved in the production of knowledge and what political agenda are they challenging (Gaventa & Cornwall, 2006). In relation to my field work I

undoubtedly had an influence as the facilitator (whether I intended to or not) on what was and was not included on the map by the children. Then the consciousness is the invisible powers which alters our conceptual boundaries of what we believe is possible. Our own conceptual boundaries and state of consciousness will affect whether or not the knowledge produced from the participation can transform into action (Gaventa & Cornwall, 2006). In this regard the challenge of child-participation is whether our society is ready to expand our consciousness and recognise the capacities of children and their ability to raise wider community concerns (Martin, 2010; Mitchell et al., 2009).

At large the community bought into the overall process and importance of children's participation. However, their participation had limits and needed to fit within a defined boundary. This was experienced when the students tried to take the lead and organise a mapping day over the weekend. This idea however was rejected due to the inconvenience it would have on the adults within the community. Gaventa and Cornwall's (2006) concept of participation resonates with the different challenges and aspects of LEGO mapping as a participatory tool. While some academics such as Mitchell et al (2009) argue that excluding children's knowledge dismisses a valuable resource in developing practical DRR solutions, there also must be wider societal willingness and acceptance of child-participation in decision making. LEGO mapping was innovative and a novel idea that had never been done before. It challenged the status quo of what is possible and addresses many of the areas of concern around child participation such as the production and making knowledge tangible, interactive, creative and playful. While the tool itself does have limitations around the logistics of using the tool, it also has the potential to change how DRR strategies build resilience of children through meaningful play. However, in order to really transform and harness children's participation then researchers, practitioners, government, non-government agencies and guardians must be prepared to expand their consciousness to listen and involve children in the DRR process.

5.5 *Conclusion:*

The concept behind this thesis research hypothesised that LEGO mapping could be used as an effective tool and provide a practical solution to children's participation in DRR. While the tool was effective in fostering participation, LEGO mapping posed challenges to both children and facilitator. These challenges were primarily around the logistics of ordering bricks and ensuring that the right bricks were available (e.g., size, shape and colour) so children did not lose momentum. The technical challenges which were encountered highlighted the importance of play when fostering children's participation, and that the tools used to harness participation should not take away from the playing process and dwindle participation. Despite the logistical challenges faced the tool was accessible and familiar to all of the students in the group, placing the power into their hands. The tool enabled students to produce visual and interactive knowledge, that could easily be accessed by a variety of stakeholders. However, LEGO mapping should still be carefully considered in terms of which community and age range it is used with, as it might not always be culturally appropriate in older children (e.g., 14-18 years) or non-Western countries.

The framework which informed this research design illustrated a way for children's knowledge to be associated with scientists, researchers, policy makers and practitioners. The production of the three-dimensional map was thought to help connect the disconnect between stakeholders. Yet, despite the outcome of the children's participation (in producing a 3D map of their community) there are still challenges around connecting children's knowledge with practitioners and outside stakeholders. This is, however, more reflective of a societal and systematic problem within DRR rather than the tool itself. Nevertheless, the tools used to engage children in DRR as well as the design and implementation of any participatory project should be carefully considered. Facilitators and researchers should always keep in mind what the original purpose of the research is, and what is the best way for children's

participation to benefit them and the wider community? Therefore, it is important that facilitators and researchers do not place all their attention on the success of one tool. But rather researchers and facilitators should utilise both the children's and their own wider network to ensure the right stakeholders are included at the right times for sustainable and practical solutions.

The framework used to inform this thesis research also paved a path for knowledge and dialogue to mobilise into action and change within DRR. However, for children's participation to be fully endorsed children's caregivers, community members and DRR stakeholders need to be able to change their attitude towards child participation (Martin, 2010). In this sense children's participatory tools, such as LEGO mapping have many hurdles to overcome yet. This is because they are not only overcoming their own technical limitations but also the limitations society places on children.

Chambers (1995) states that our global systems continue to perpetuate deprivation and inequity, because we continue to neglect the role of "us" the powerful in the equation. When examining a problem, any thorough analysis should look at the whole picture not just one side of the equation (Chambers, 1995). However, we continue to hold conferences, forums and undergo research that predominantly focuses on "them" the powerless and neglect to put a spotlight on "us" the powerful (Chambers, 1995). The challenges of child-participation within DRR are complex and transcend disciplinary boundaries, at a macro and micro level. Therefore, when looking at LEGO mapping and the practicality of the tool we must also consider whether our society is genuinely ready for child led action and decision making, not just children's participation in DRR.

Chapter Six: Concluding Thoughts and Future Research

6.1 The catalyst:

This research sought to better understand children's participation and the potential capacities, barriers and limitations within the field of DRR. When reflecting on this research journey if there is one lesson learnt it is that children's participation is overwhelmingly complex. Some academics argue that child-participation is a valuable resource that should be better harnessed, while others dismiss it as a naïve notion for children who simply do not have the decision-making powers of adults. Either way our understanding of children's capacities and children's ability to contribute to the field of DRR is incomplete and infrequently questioned. So, at the end of this research journey and experiencing for myself the participatory process I cannot help but ask: is children's participation in DRR an area worth exploring?

There is now scientific consensus that the change in climate will increase the frequency of floods, droughts and extreme weather events, making children at increased risk in the face of hazardous events (UNICEF, 2016). Not only is the frequency of extreme weather events expected to rise, but human activity has intensified and made the world we live in more hazardous (Wisner et al., 2018). Rapid and unplanned urbanization, inequality, climate change and inequitable economic policies have severe and complex consequences in the field of DRR. Disasters as a result of extreme weather events not only damage infrastructure such as schools, hospitals and households but also destroy crops, water systems and can increase the spread of vector-borne illnesses such as malaria or dengue fever (UNICEF, 2016). Children, elderly, women and those living in the most impoverished communities continue to be disproportionately affected by disasters (UNCIEF, 2016; CRED, 2016). The social injustices that pre-exist within our societies only intensify vulnerabilities and the impact of disasters. Within the field of DRR, social justice is a matter of life and death (WHO, 2008).

Children are often described as one of the world's most vulnerable groups in the face of a disaster, with most of the literature focusing on their vulnerabilities and trauma in a post-disaster context (Peek, 2008; Ronoh et al., 2015; Wisner et al., 2018; Wachtendorf et al., 2008). While many children do rely on the adults in their lives for support and protection, this does not mean they are merely passive victims of disasters (Peek, 2008; Wisner, 2006; Wachtendorf et al., 2008). The fact that someone is vulnerable in one area does not mean they lack capacities in other areas. As Gaillard (2010) highlights that capacities and vulnerabilities do not sit at opposite ends of a spectrum.

Children are as heterogenous as the adults of the world, and come in different genders, ethnicities, socioeconomic backgrounds, cultures, religions and abilities (Delicado et al., 2017). Being a child of school age (5-18 years) is a particularly unique time in a person's life, where a school-aged child is connected to a large social support system via their school community (Wachtendorf et al., 2008). Most children's time is dedicated to a learning environment, surrounded by their peers from their wider community (Wachtendorf et al., 2008; Peek, 2008; Anderson, 2005). Children also have an abundance of energy, enthusiasm and creativity, which at large is left untapped. The rhetoric surrounding children in the field of DRR continues to focus on the various ways in which they are weak or vulnerable, yet little research exists about children's capacity to produce knowledge, conduct risk assessments and be their own agents of change (Anderson, 2005).

It was the goal of this thesis to understand children's capacities and potential, rather than to continue to focus on children's vulnerabilities which were the catalysts for this research. This research examined the effectiveness of LEGO in fostering children's participation in DRR. To answer this question, I set out to investigate the following research objectives: (1). assess the strengths and

limitations of LEGO, as a participatory mapping tool, with children (2). evaluate the role of LEGO, in producing children's knowledge about disaster risk within their community (3). determine the best practice of using LEGO to increase children's participation in DRR activities.

6.2 Summarising my research journey:

The setting of this research took place in Maraekakaho, Hawke's Bay. Maraekakaho is a small rural viticulture and agriculture community situated 21.5 kilometres west of Hastings. Maraekakaho and the wider Hawke's Bay is no stranger to the wrath of natural hazards experiencing a wide range of recurrent weather events (ECL, 2018). Despite extensive flood control works, flooding is still a significant risk to Maraekakaho during the winter months while bush fires are a common occurrence during the summer months (ECL, 2018). As a result, the Maraekakaho community has a proactive civil defence volunteer leadership group, that approached practitioners from Hawke's Bay Regional Civil Defence Emergency Management (CDEM) with a request for a community resilience plan.

This research was part of a wider project called 'Participation and technology in citizen science for strengthening resilience to natural hazards' (P-TECH in CITSCI), which was funded by the *Ministry of Business, Innovation and Employment* (MBIE). The wider project aimed to pilot the use of participatory mapping with the use of drones, video games and LEGO sets to foster citizen participation in enhancing community resilience to natural hazards. The project field work was led by researchers from AUT and The University of Auckland in collaboration with local practitioners such as East Coast Labs and Hawke's Bay Regional CDEM group. Local practitioners from East Coast Labs and CDEM played a central role in the initial stages of the project with introductions between researchers and Maraekakaho school and Maraekakaho civil defence volunteer leadership group. This research sought to investigate the 'LEGO mapping' component of the wider project.

The wider P-TECH in CITSCI project, to an extent helped inform and shape this thesis research. The methodology chosen for this thesis was participatory ethnography. Participatory ethnography comprises of a wide range of methodological approaches; however they all aim to hand the 'power' from the researcher to the researched by enabling communities to tell their own story and find their own solutions (Chambers, 1995; Gaventa & Cornwall, 2006; Aldridge, 2015). Participatory and ethnography research both have overlapping characteristics such as placing a high value on insider knowledge, generally producing qualitative data (but not always) and generating solutions which fit and align with the communities priorities (Bloomberg et al., 2013; Chambers, 1995; Pretty, 1996). By combining both participatory and ethnography methodologies these overlapping characteristics complimented each other and allowed for a more in-depth analysis of the information produced. This allowed me to tap into my own researcher and facilitator insight as well as tell the story from the children's perspective.

Gaining the children's, teachers and wider communities trust and respect was a critical step in my research journey. However, trust and respect are not things you can instantaneously gain, nor do they come easily. Trust and respect follow their own organic timeline, which when working within a defined time frame, can at times be a point of tension. In order to gain the trust of the community members, I moved down to Hawke's Bay and immersed myself in the community. This not only helped build rapport, but it was a crucial aspect of contextualising my own understanding of the Maraekakaho community and the way of life for people living there.

Ensuring that the school teachers and students were involved continuously over the course of my field work from the co-designing of the sessions to the production of knowledge was of high-priority for me. The teachers played a pivotal role in developing the tools used to engage with the students, such

as length of each session and group size. This ongoing process of co-designing required flexibility and a researcher and facilitators ability to be adaptable. Ultimately, I knew that the teacher's knowledge about their students and community was paramount in the overall success of the project.

The participants included 13 students aged 10-12 years. A variety of participatory tools were used throughout this thesis such as one-word activities, carousels and participatory mapping with LEGO. Phase one of my research method (session one to four) had two main objectives: to build a strong foundation and rapport with the children as well as start a dialogue about past hazardous events that have affected their community. This in turn meant that when students broke out into their smaller 'project technology groups' (for phase two of the field work) they were empowered by their own knowledge and were ready to start mapping. Phase two of the field work was from session five to 15, made up of ten 90-minute sessions. Phase two was where the LEGO mapping began, which is also known as P3DM. Rambaldi (2010) defines P3DM as a participatory mapping method "based on extracting topographic information (i.e. contour lines) from scale maps, and then constructing a physical model that is used to locate peoples' spatial memories." (p. 3).

The rationale behind using LEGO as a P3DM tool was to find a practical solution to the challenges faced in children's participation within DRR. LEGO mapping was thought to engage children in DRR in a fun and creative way that produced tangible knowledge which could bridge the gap between 'inside' and 'outside' stakeholders. The results found LEGO mapping to be an enjoyable experience for both the students and researcher. LEGO in the context of New Zealand, and within the high-decile primary school of Maraekakaho sparked immediate interest from the children to participate. The tool itself did not require any prerequisites to participate and LEGO mapping was transferrable amongst the male and female students of the group. These qualities made LEGO as a P3DM tool accessible to all levels of ability, age and background within the group. Due to the students experience and familiarity with LEGO it placed them into a unique leadership position where their recent experience with the tool made them the 'experts' throughout the building process. Once the LEGO mapping began the students were providing advice to me (the adult) on the best way of using the tool, in contrast to other participatory activities used during phase one of the field work where I would be advising the students. The outcome was a three dimensional, colourful, creative and an interactive display of their community, defined in their own unique way.

LEGO mapping as a tool was found to have its own set of challenges, both for the children and facilitator. Many of the limitations encountered and identified by the students revolved around the technical limitations of the LEGO brick such as shape, size, colour and quantity. This in turn made the building of the base of the map much more labour intensive than initially anticipated. When the technical limitations became too burdensome to the group this would have a domino effect on the children's motivation and affect the detail of knowledge produced. Which reiterates the fact that participation with children needs to fun and playful in order to encourage participation.

A benefit of using LEGO is that the map can be taken apart and reconstructed, therefore if the student's or school wish to add more detail, information or alter the map they can do so easily. For the most part, the children worked in a harmonious and autonomous way and when technical challenges arose this catapulted the children into a group debate. This resulted in the children having to come together as a group and collaborate as to how they would overcome the issue. The main purpose of this research was to test the practicality of using LEGO mapping as a tool to foster children's genuine participation in DRR. This research also wished to bridge the gap between children and DRR practitioners and researchers to influence the decision-making process. Despite the strengths and capabilities of LEGO mapping as a children's participatory tool in DRR, it was unsuccessful in truly influencing any immediate change to the field or within the local community with regards to DRR

solutions. LEGO mapping does not claim to provide a solution to children's participation in DRR. This research does however provide more insight into the capabilities of children and their ability to raise the wider concerns of the community and conduct risk assessment. LEGO mapping can be used as a practical solution to foster children's participation in DRR, by including children in the DRR process in a creative and playful manner. However, it is unrealistic to claim that one tool on its own can solve the compounding challenges which face children's participation in the field of DRR today.

6.3 A final recommendations for future research:

At the beginning of the research journey the students had two expectations of me. Firstly that "I don't treat them like babies and listen to their ideas" (22 March 2018). Then secondly that I "make their learning fun, enjoyable and creative" (22 March 2018). These two expectations became a priority for me over the course of my research field work. However, when reflecting on the overall research journey the expectations expressed by the children themselves seem to be the most relevant piece of advice to pass on to any researcher wishing to advance the child-participatory agenda in DRR.

This research re-emphasised the idea that in order to really transform and harness children's participation then researchers, practitioners, government and non-government agencies must be prepared to expand their consciousness to listen to children and involve them into the DRR process. In an era where participation has emerged as a buzzword across policy and research there is a critical difference between participation as a bureaucratic exercise and participation as a process where true power is handed over and participants are able to affect change (Arnstein, 1969; Hart, 1992; Pretty, 1996 & Gaventa, 2006). Despite the widely accepted rhetoric around participation, it is clear that simply creating new tools to foster participation will not necessarily result in inclusion, action or influence of decision making (Gaventa, 2006). Rather the potential of participation rests upon the micro and macro influences of power.

To go back to my original question posed at the start of this chapter: is children's participation in the field of DRR an idea worth exploring? At the end of this research journey I would have to say yes. While it might be cliché it is never the less the truth, that the children of today will be the leaders of tomorrow. We live in a time with rapid unplanned and informal urbanization, climate change and environmental degradation (Wisner et al., 2018; UNICEF, 2016). These factors place millions of people across the globe to live in high risk exposure zones, which only increases the risk of disaster (UNICEF, 2016). Children and their children will feel the burden of this longer than the adults of today. Therefore, their participation is not only vital in the field of DRR but it is also vital in today's discussions and decisions about climate change action (UNICEF, 2016; Martin, 2010, Mitchell et al., 2009).

To move forward and advance the agenda of involving children in DRR research and initiatives, I would encourage researchers to do two things. The first being that it is critical for researchers when working with children to be more reflective and understand the role they play in the research journey. Participatory ethnography research that is done with people, instead of done about people are successful because the research design has carefully considered the existing power dynamics, the process and the participants priorities (Chambers, 1995, Gaventa, 2006). When working with children it is critical that researchers understand the bigger powers of influence both at a micro and macro level. Not only should researchers be critical of the tools we use to engage with children, but also of the role we play in the production of knowledge. LEGO mapping as a participatory tool to foster children's participation in DRR, has many hurdles to overcome yet. The method used over this research still needs refinement. Not only does LEGO mapping have its own technical challenges to overcome, but also in the way that it challenges many societal notions around power and decision making which are engrained into our systems.

The second piece of advice is allowing ourselves as a collective of researchers and DRR practitioners to be more honest in the fact that no one person, tool or strategy holds the solution. Many people still perceive children's participation as a naïve notion for children who simply do not have the decision-making powers of adults (Hart, 1992). However, some could also argue that 'we' who write, conduct research and attend conferences to talk about participation and the problems of the world are naïve in thinking that we can fix the problems all by ourselves. Children's participation needs to become a priority within the field of DRR if we are to take climate change seriously. Children's participation should not just be considered as morally correct but should be standard practice, if we wish to create sustainable solutions within DRR. If we genuinely wish to reduce people's vulnerabilities to disasters, inclusivity should be a priority moving forward (Tatebe & Mutch, 2015). Therefore, children's participation must be a priority that filters through our systems, institutions and policies, because the decisions made now will have the greatest effect on the children of today.

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Appendix One: Consent Forms

a). Example of consent form given to:

School principal at Maraekakaho Primary School

b). Example of consent form given to:

Parents and guardians of students at Maraekakaho Primary School

Permission for researchers to access organisation school staff / students.

For use when permission is being sought from the head of an organisation to undertake research within the organisation or with the organisation's people.

Project title: **Participation and technology in citizen science for strengthening resilience to natural hazards (P-TECH in CITSCI)**

Project Supervisor: ***Dr Loic Le De***

Researcher: ***Nickola Loodin***

- ○ I have read and understood the information provided about this research project in the Information Sheet dated 27/07/2017.
- ○ I give permission for the researcher to undertake research within _____
- ○ I give permission for the researcher to access the staff / students of _____

Principal's CEO's signature: .....

Principal's CEO's name: .....

Principal's CEO's Contact Details (if appropriate):

.....

.....

.....

.....

Date:

***Approved by the Auckland University of Technology Ethics Committee on 14th of November, 2016 AUTEC Reference number* 16/398**

Note: The head of the organisation should retain a copy of this form.

Parent/Guardian Consent Form

Project title: ***Participation and technology in citizen science for strengthening resilience to natural hazards (P-TECH in CITSCI)***

Project Supervisor: **Dr Loic Le De**

Researcher: ***Nickola Loodin***

- ○ I have read and understood the information provided about this research project in the Information Sheet dated 27/07/2017
- ○ I have had an opportunity to ask questions and to have them answered.
- ○ I understand that notes will be taken during the interviews and that they will also be video recorded and transcribed.
- ○ I agree to my child/children to be video recorded (please tick one): Yes○ No○
- ○ I understand that taking part in this study is voluntary (my choice) and that I may withdraw my child/children and/or myself from the study at any time without being disadvantaged in any way.
- ○ I understand that if I withdraw my child/children and/or myself from the study then I will be offered the choice between having any data that is identifiable as belonging to my child/children and/or myself removed or allowing it to continue to be used. However, once the findings have been produced, removal of our data may not be possible.
- ○ I agree to my child/children taking part in this research.
- ○ I wish to receive a summary of the research findings (please tick one): Yes○ No○

Child/children's name/s:……

……..

Parent/Guardian 's signature:……

Parent/Guardian 's name:……

Parent/Guardian 's Contact Details (if appropriate):

……..

……..

Date:

***Approved by the Auckland University of Technology Ethics Committee on 14th of November, 2016 AUTEC Reference number* 16/398**

Note: The Participant should retain a copy of this form.

Appendix Two: Participant Information Sheets [PIS]

a). Example of PIS given to:

Student's at Maraekakaho Primary School

b). Example of PIS given to:

Parents and guardians of students at Maraekakaho Primary School

Participant Information Sheet

Date Information Sheet Produced: 27/07/2017

Project Title

Participation and technology in citizen science for strengthening resilience to natural hazards (P-TECH in CITSCI)

An Invitation

Hi there, my name is Loic Le De and I am a researcher at the Auckland University of Technology (AUT). I would like to invite you to take part in a research study that I am running.

The research is funded by the Ministry of Business Innovation and Employment. The research will look at how we can how we can encourage children such as yourself to become involved in preparing and planning for an emergency such as an earthquake or flood. This will involve you working with your classmates to build a model of your community using Lego or Minecraft and identifying what natural hazards and resources your community has in an emergency.

It is up to you whether or not you want to take part in this research and it is okay if this is not something that you do want to do. If you do choose to take part in the research and then change your mind than that is all okay and you can just let your teacher or myself know.

Please read below for more information about the research and let us know if you have any questions. Thank you very much.

What is the purpose of this research?

To look at how we can how we can encourage children such as yourself to become involved in preparing and planning for an emergency such as an earthquake or flood

How was I identified and why am I being invited to participate in this research?

Your teachers thought your class was the best class to be take part in this research.

How do I agree to take part in this research?

It is up to you whether or not you want to take part in this research and it is okay if this is not something that you do want to do. If you do want to take part than I can give you a consent form to fill out. Remember, if you do choose to take part in the research and then change your mind than that is all okay and you can just let your teacher or myself know. If you do not choose to participate in the

mapping activities or who do not return a Consent Form, you will be involved in the documenting the process (e.g., video recording, taking pictures etc.).

What will happen in this research?

If you decide to take part, you will be invited to take part in about two sessions per week during class hours at your school. Each session will be about an hour to an hour and a half.

In these sessions, we will do a few different activities and discuss what you know about your community, natural hazards such as earthquakes and flooding. You will make a map of your school and community using Lego or Minecraft.

The workshops may be filmed to make a video of all the different activities you will be doing. You can choose whether to be in the video as we can edit you out if needed. The final video will then be used to show other people who might want to try using Lego or Minecraft with other children around the country (or world) to make maps of their community.

Face-to-face interviews will also be done so you can talk about the activities that you have been a part of. Interviews will last about 20 to 30 minutes. In total, the research shall take 20 hours of your time.

What are the risks?

There are no known risks caused by this study. If you feel uncomfortable at any time you can take a break from the activities if you would like to, and/or have a parent present during the activities.

What are the benefits?

You will learn more about natural hazards and disaster and will learn how to be better prepared and respond to these types of emergencies.

How will my privacy be protected?

Because you will be doing this in class with some of your classmates, we can't guarantee your privacy. We will not include any of your personal information in anything we publish or present from this research.

Only myself and my research team will have access to the notes taken and/or the recoding of the interview (if you do an interview). The recording of interview will be stored in a secure location for a period of six year before being destroyed.

What are the costs of participating in this research?

There are no financial costs nor financial compensation for participating in this research. You will get a certificate at the end of the research for participating.

What opportunity do I have to consider this invitation?

You will be given two weeks from the time you were given this sheet to consider whether you want to take part invitation. I will do one follow-up after two weeks to know if you want to take part.

Will I receive feedback on the results of this research?

When we have finished the research, we will send a summary to your teacher to share with your class.

Who can I contact for further information about this research?

Please keep this Information Sheet and a copy of the Consent Form. If you have any questions than you can talk to your teacher or myself or anyone in the research team. My details are : Loic Le De – Email: Loic.le.de@aut.ac.nz

What do I do if I have concerns about this research?

If you are worried or feel uncomfortable at any point in the research than you can talk to the teacher or myself.

Concerns regarding the conduct of the research should be notified to the Executive Secretary of AUTEC, Kate O'Connor, *ethics@aut.ac.nz* , 921 9999 ext 6038.

Approved by the Auckland University of Technology Ethics Committee on 14th of November, 2016
AUTEC Reference number 16/398

Participant Information Sheet

Date Information Sheet Produced:

27/07/2017

Project Title

Participation and technology in citizen science for strengthening resilience to natural hazards (P-TECH in CITSCI)

An Invitation

My name is Dr Loic Le De and I am a researcher at the Auckland University of Technology (AUT), New Zealand. The present research deals with the development of participatory tools and emerging technology within the context of Disaster Risk Reduction (DRR) and development. It is funded by the Ministry of Business Innovation and Employment. Your child has been invited to take part in a research project that focuses on the role of technology as educational tools to foster children's / adolescents' participation and knowledge in strengthening resilience to natural hazards in New Zealand, and more specifically in Hawke's Bay. This study is coordinated by the Auckland University of Technology. Your child's participation is entirely voluntary (your choice). She / he does not have to take part in this study. If you do agree to her / him taking part, you and your child are free to withdraw from the study at any time, without having to give a reason. To help you make your decision please read this information sheet. You may take as much time as you like to consider whether or not to take part, and we are happy to answer any questions you might have. Thank you very much.

What is the purpose of this research?

Natural hazards such as flooding, earthquake and drought can have significant impacts on local communities. If local communities are not well prepared, natural hazards may turn into a disaster. If people are aware about the risk associated with such events and know what to do when they happen, the risk of disaster can be significantly reduced. Children's and adolescents' participation in activities that deal with natural hazards and disaster can thus help increase preparedness and reduce the risk of disaster. Educational tools using mapping with Lego sets or Minecraft may enable, through play, the participation of children and adolescents in disaster-related activities. These may also permit to cater for their knowledge about natural hazards and disaster. The aim of this study is therefore to understand the contribution of technology in fostering children's and adolescents' participation and knowledge in strengthening resilience to natural hazards in New Zealand, and more specifically in Hawke's Bay.

How was I identified and why am I being invited to participate in this research?

As a member of the community your child was identified as a potential participant to this research.

How do I agree to participate in this research?

Your child's participation in this research is voluntary and whether or not you choose to participate will neither advantage nor disadvantage her / him. I shall provide you with a Consent Form where you can indicate your willingness to have your child participating in this research on the day of the focus group discussions with participatory activities and / or interview.

What will happen in this research?

If you decide that your child will participate, she/he will be invited to take part in six workshops, which require the use of Minecraft (for high school children) or Lego modelling (for primary school children) to simulate disaster risk and resilience within the game environment. Lego modelling will imply collecting, plotting and analysing data pertaining to the school and surrounding area. Lego modelling shall enable engagement of children in playful activities while emphasising their knowledge of their own social and physical environment and permitting to foster learning and awareness raising. Minecraft will involve the participation of adolescents to recreate specific areas of Hawke's Bay and eventually collect, plot and analyse spatial data as well as simulate scenarios of disaster risk and resilience within the game environment. The workshops will be held during class hours at your child's school. Each workshop will last about 90 minutes. Workshops shall be filmed to produce a video that documents the activities. The final video will be used to inform practitioners and other researchers who wish to reproduce these activities step by step. You will have the opportunity, once the video is edited, to remove the footages of your child. Face-to-face interviews will also be conducted to share about her / his experience about the use of Minecraft or Lego mapping. Interviews will last about 20 to 30 minutes. In total, the research shall take about eight hours of her / his time.

What are the discomforts and risks?

Taking part in this study will take some of your child's time and require them to answer a series of questions and participate in some activities involving natural hazards. There are no known risks caused by this study.
If your child feels uncomfortable at any time she / he can take a break from the activities if she / he would like to, and/or have a parent present during the workshops.

What are the benefits?

This research project will foster children participation in issues that directly affect them (i.e. natural hazards, disasters). This study should contribute to increase children's awareness and preparedness natural hazards.

How will my privacy be protected?

Due to the collective nature of the activity privacy cannot be guaranteed to people participating in the focus group discussion with participatory activities. Personal information about participants will be excluded from academic papers and presentations arising from this research and every possible effort will be made to guarantee that the identity of participants remains anonymous. Only I and my research team will have access to the data collected. The notes taken will be stored in a secure location for a period of six year before being destroyed. In order to ensure confidentiality, the information produced/shared during the focus groups discussions with participatory activities should not be shared with other people outside of such activities.

What are the costs of participating in this research?

After your child has completed the workshops, she/he will receive a certificate. Refreshments will be provided.

What opportunity do I have to consider this invitation?

You will be given two weeks upon receipt of the Participant Information Sheet to consider the invitation. I shall do one follow-up after two weeks to know if you are interested to participate.

Will I receive feedback on the results of this research?

A summary of the findings of the research can be emailed to you if requested in the Consent Form.

What do I do if I have concerns about this research?

Any concerns regarding the nature of this project should be notified in the first instance to the Project Supervisor,
Dr. Loic Le De, Loic.le.de@aut.ac.nz.
Concerns regarding the conduct of the research should be notified to the Executive Secretary of AUTEC, Kate O'Connor, *ethics@aut.ac.nz* , 921 9999 ext 6038.

Whom do I contact for further information about this research?

Please keep this Information Sheet and a copy of the Consent Form for your future reference. You are also able to contact the research team as follows:
Marcus Hayes-Hones – Email: Marcus.hayes-jones@hbemergency.govt.nz

Researcher Contact Details:

Dr. Loic Le De – Email: Loic.le.de@aut.ac.nz

Approved by the Auckland University of Technology Ethics Committee on 14 November 2016, AUTEC Reference number 16/398.