

WHAT IS FLOOD RESILIENCE EDUCATION?

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Abstract

Community flood education, communication and engagement (ECE) is an integral component of emergency management in Australia and around the world. Its main goal is to promote public safety and, to a lesser extent, reduce damages. However, many governments around the world, including Australia, aim to also build community disaster resilience, with learning viewed as a critical mechanism. There is therefore a need to examine current community flood ECE practices with a view to aligning them to the broader goal of disaster resilience. To attempt this, an exploratory research methodology was utilised to examine possible education content and processes that could be used by emergency agencies and other organisations to design plans, programs and activities that build disaster resilience in local communities.

The research found that flood resilience ECE content should not only cover preparedness and response aspects, but also learning about speedy and effective recovery for people, organisations (e.g. businesses) and communities. It found that flood resilience ECE should also involve learning about the community itself, including how to reduce vulnerabilities and connect communities through social capital formation.

As a result of the research, opportunities for flood resilience ECE were identified in the main learning domains: behavioural, cognitive, affective and social. The findings demonstrated that many current flood ECE programs are only using limited parts of this learning 'spectrum', although this would be significantly increased by further embracing social media as a disaster resilience learning medium. The research also identified a framework to design flood resilience ECE programs that can be used for any community. The framework includes guiding principles, 'palettes' from which to choose appropriate learning content and processes, and a series of 'filters' to tailor the programs to specific flood-impacted communities.

Introduction

Emergency agencies and other emergency services organisations around the world provide a range of educative services to people and communities including public relations, warning communications, formal education programs (e.g. with schools), volunteer training and community engagement. These services can be carried out by different sections or divisions of the agencies. As a result, there is a tendency for emergency agencies to divide flood and other hazard educative services into at least community 'education', 'communications' and 'engagement', which have slightly different processes (Dufty, 2013). As shown in Figure 1, what is common with education, communications and engagement (ECE) is that they all contribute to disaster-related learning for people, organisations (e.g. businesses) and communities.

The main goal of flood ECE is to promote public safety and, to a lesser extent, reduce flood damages. A particular challenge for flood ECE is to promote behaviours for events that are not regular in occurrence and may not occur during the learner's lifetime.

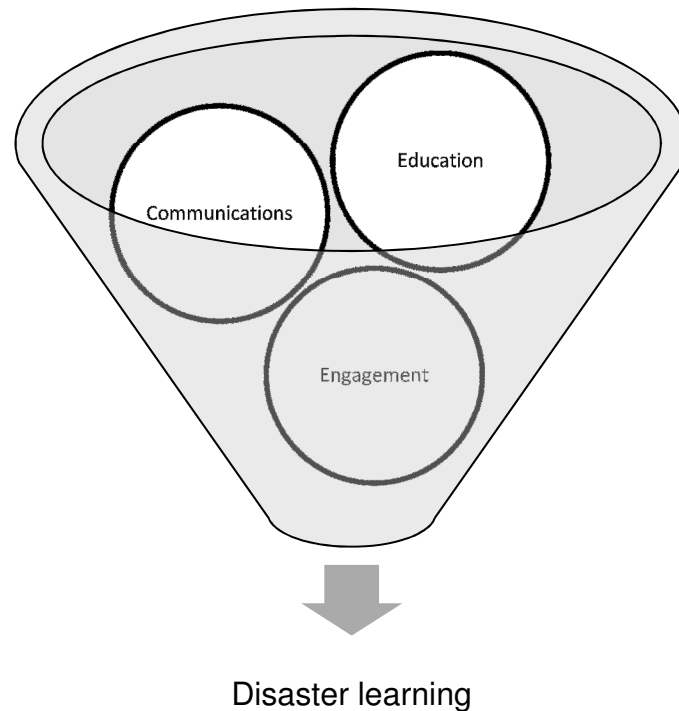


Figure 1: Disaster education, communications and engagement all lead to disaster-related learning

There has been considerable activity in community disaster ECE across the world, particularly with the advent of social media. The range of these initiatives has been well-researched. For example, Molino Stewart (2012) categorised current disaster ECE activities into four main groups:

1. Public communications, information products and services e.g. publications, internet sites, displays, promotional products, media liaison, advertising/marketing, social media.
2. Training, development and industry-specific programs e.g. skills development courses, leadership training, mentoring, emergency drilling and exercising.
3. Community engagement programs e.g. public participation programs, forums, discussion groups, events, developing networks, social media.
4. Comprehensive personal education programs e.g. school curriculum, university curriculum, personal development courses, action research programs, community education courses.

However, there has been relatively little research into the appropriateness and effectiveness of the community flood and other disaster ECE programs and activities, including those provided by emergency agencies. This is due largely to the general lack of evaluation of these programs (Elsworth et al, 2009) and the difficulty in isolating education as a causal factor in aspects of disaster management performance (e.g. preparedness levels, evacuation rates, business continuity).

The paucity of this research is also due to disaster ECE not being embraced strongly by specialist educators that are versed in learning theory and practice. As Preston (2012, p.1) states 'there is surprisingly little writing in the field of education/pedagogy itself'. This is largely due to disaster education being a 'new area of enquiry in the field of education'

(Preston 2012, p.1) and because many of the disaster ECE programs are designed by non-educators (e.g. engineers, planners) from emergency agencies and other organisations. As a result, there is a large amount of disaster ECE activity around the world with little technical research into its educational veracity.

In addition to the concern about the education foundation for disaster ECE, there is now the call by governments around the world for learning related to disaster resilience. The concept of resilience has been in the disaster management literature since the 1980s (Wildavsky, 1988) but has come into vogue as an overriding goal in the past decade. There are a multitude of definitions of 'disaster resilience'. The original notion of resilience, from the Latin word *resilio*, means to 'jump back' or 'bounce back'. According to de Bruijne, Boin and van Eeten (2010, p. 13):

'In the past decades, research on resilience has been conducted at various levels of analysis – the individual level, the group level, and the organizational or community level – in a wide variety of disciplines including psychology, ecology, organization and management sciences, group/team literature and safety management.'

Several researchers (e.g. Longstaff, 2005) have made an interdisciplinary effort to further refine the concept of resilience in relation to disaster management. However, a dilemma for researchers and planners is whether disaster resilience should involve the ability of a community to 'bounce back' (i.e. resume its normal functioning) as per the original notion, or to 'bounce forward' after a disaster (Manyena et al, 2011). Some researchers such as Paton (2006) opt for the latter notion arguing that the 'bounce back' idea neither captures the changed reality after a disaster, nor encapsulates the new possibilities wrought by a disaster. Thus, community resilience may comprise coping, adaptive and transformative capacities (Keck and Sakdapolrak, 2013).

Although the academic debate continues on what precisely is disaster resilience, many governments around the world have developed strategic policies and plans that aim to guide countries toward achieving it. Education (learning) is seen as a critical component of most resilience building strategies. For example, the Hyogo Framework for Action (International Strategy for Disaster Reduction, 2005) was an outcome of the 2005 World Conference on Disaster Reduction held in Kobe, Japan. One of its five priorities for action is using 'knowledge, innovation and education to build a culture of safety and resilience'.

In December 2009, the Council of Australian Governments (COAG) agreed to adopt a whole-of-nation, resilience-based approach to disaster management, which recognises that a national, coordinated and cooperative effort is needed to enhance Australia's capacity to prepare for, withstand and recover from disasters. The National Emergency Management Committee subsequently developed the National Strategy for Disaster Resilience which was adopted by COAG on 13 February 2011.

The purpose of the Strategy is to 'provide high-level guidance on disaster management to federal, state, territory and local governments, business and community leaders and the not-for-profit sector. While the Strategy focuses on priority areas to build disaster resilient communities across Australia, it also recognises that disaster resilience is a shared responsibility for individuals, households, businesses and communities, as well as for governments. The Strategy is the first step in a long-term, evolving process to deliver sustained behavioural change and enduring partnerships' (Attorney-General's Department, 2014). An important component of the Strategy (COAG, 2011) is learning, including 'communicating with and educating people about risks'.

There is therefore a need to identify pedagogical content and practices that not only help to ensure public safety during and after a disaster, but that also help people and communities return to normal functioning, and if possible, 'bounce forward' after a disaster.

Theory and Method

Dufty (2012) commenced an investigation to identify what could be an effective approach to building disaster resilience for people, organisations and communities through learning. He coined the term 'Learning for Disaster Resilience' (LfDR) for this approach.

Guiding principles for LfDR that were identified from this research include:

- Programs and activities should be learner-centred and thus an understanding of the learning community is important in their design (Elsworth et al, 2009; Molino Stewart, 2007). This can be achieved through social research processes such as community profiling, surveying and social network analysis.
- The design, implementation and evaluation of disaster resilience learning programs and activities should be participatory (e.g. coordinated with residents through local committees).
- Learning should be aligned with structural and other non-structural methods used in disaster risk reduction, and be an integral part of emergency management measures such as operations and emergency planning (Molino Stewart, 2007).
- Learning programs and activities should be designed for before, during and after a disaster.
- The provision of learning programs and activities should be ongoing, as a disaster may occur at any time (Dufty, 2008).
- A cross-hazard and cross-agency approach is required for the provision of learning programs and activities (Dufty, 2008).
- Evaluation should be a critical requirement of all LfDR plans and programs (Elsworth et al, 2009).

However, further research was required to identify potential content and processes that could be used in community LfDR plans and programs.

A challenge for an examination of what could be appropriate and effective LfDR is unravelling the complexities of the relevant disaster research. Preston (2012, p.1) notes that 'the disciplinary boundaries of disaster education are fluid and the literature on the topic can be found within the sociology of disasters, public health and health promotion, humanitarian response, political communication and public relations'. 'Normal' confirmatory research used regularly in emergency management would struggle with this type of complex strategic and conceptual examination.

Exploratory research – heavily used in marketing and the social sciences – was identified as an appropriate research approach for this examination. According to Davies (2006, p.1), 'Exploratory research is a methodological approach that is primarily concerned with discovery and with generating or building theory. In a pure sense, all research is exploratory. In the social sciences exploratory research is wedded to the notion of exploration and the researcher as explorer'. Two of its main uses are to 'gain additional insights before an approach can be developed' and to 'isolate key variables and relationships for further examination' (Bhatia, 2010).

Content

A framework (Figure 2) was used to help focus the exploration of possible LfDR content. As shown in Figure 2, it concentrated on the nexus between disaster risk reduction, emergency management and the dynamics of affected communities. This strategic relationship is supported by a significant amount of the literature including the Australian National Climate Change Adaptation Research Plan for Emergency Management (Pearce et al, 2009, p. 4) which states that:

‘When natural disasters occur, the consequences of damage and loss are a function of the effectiveness of the disaster mitigation strategies that have been implemented, the activities of the emergency services, and the resilience of the communities and economic sectors affected.’

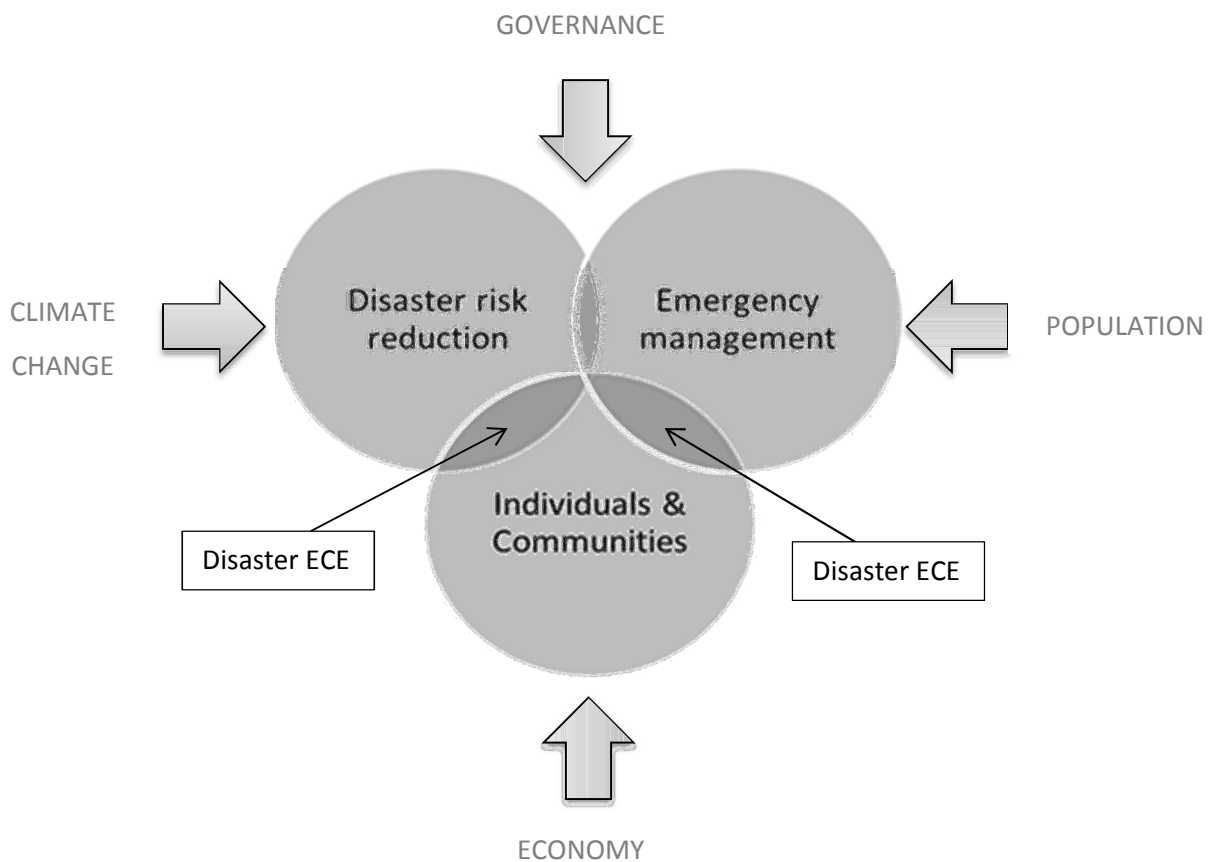


Figure 2: Scoping framework for exploring possible LfDR content

This framework positions disaster ECE at the intersection between individuals and communities, and both disaster risk reduction and emergency management (Dufty, 2012). It also acknowledges the impacts of major influences such as climate change, the economy, governance and population on the resilience 'triumvirate' prior to, during and after a hazard event (Birkmann and von Teichman, 2010).

Process

For the 'process' component of the research, exploration was conducted across the robust academic fields of disaster psychology and sociology which were then related to learning theory to identify potential ways in which people and communities may best learn. This research framework is shown in Figure 3.

Central to this exploration of appropriate and potentially effective disaster resilience learning processes is 'learning theory' which is derived mainly from education psychology. Theories about human learning can be grouped into four broad 'domains' (Dettmer, 2006). They are:

1. Behaviourism - focus on observable behaviour
2. Cognitive - learning as purely a mental/ neurological process
3. Affective - emotions and affect play a role in learning
4. Social - humans learn best in group activities.

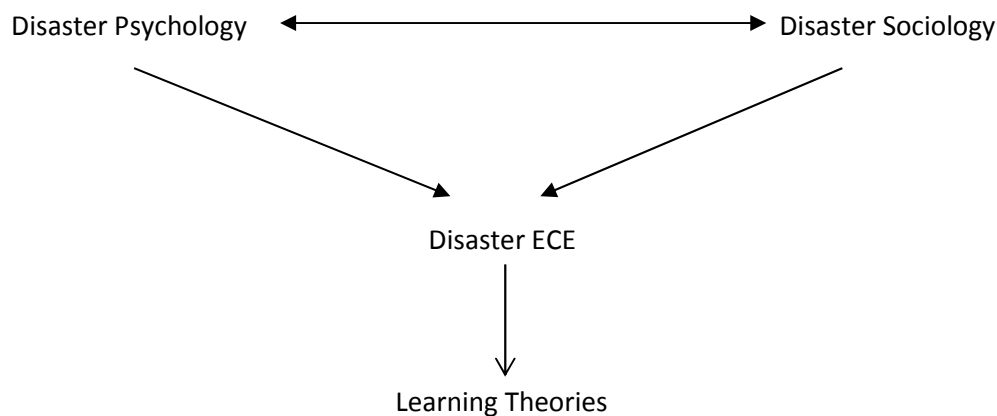


Figure 3: Framework for the exploration of disaster resilience education process

Results

Content

The exploration into the content component of potential LfDR found that if flood and other hazard ECE provided by emergency agencies is to help build disaster resilience through learning then it needs to not only be geared to public safety and reducing risks to property, but also to attaining an efficient recovery to 'bounce back' through the post-disaster relationships. Moreover, to help with a 'bounce forward' (transformative) approach to building disaster resilience, learning should also be obtained by post-disaster evaluation (lessons learned) conducted not only by agencies (e.g. after action reviews) but also with the participation of impacted communities (e.g. community de-brief meetings, resilience forums, webinars). For weather-related hazards (e.g. flood, heatwave, drought, wildfire/bushfire), learning related to climate change adaptation should be added, as it will impact on the other content. An example of a program that couples climate change adaptation learning with public safety and risk mitigation learning is described by Stevens et al (2012).

The exploration also found that the learning content of LfDR plans and programs should include both learning in response to the 'hazard', plus that related to the 'host': the at-risk

people, organisations and communities. Even though there have been great improvements (including technological) in disaster risk reduction and emergency management over the past decade, there has been no change in the general trend of increasing global disaster costs (Centre for Research on the Epidemiology of Disasters, 2012). This trend can be partly attributed to climate change, but human and societal factors appear to be a main cause (Haque and Etkin, 2012). The idea of disasters being related to social systems is not new. In 1975, White and Haas published a pioneering report on the United States' ability to withstand and respond to natural disasters. They found that research on disasters was dominated by physical scientists and engineers; little attempt had been made to tap the social sciences to better understand the economic, social and political ramifications of extreme natural events. Hewitt (1983) suggested that too much causality was attributed to the geophysical processes: everyday societal forces and patterns of living play a great role.

It therefore appears that people, organisations and their communities need to not only learn how to resist and recover from the hazard, but also to reflect on and learn ways to improve their social fabric ready for future disasters. Important aspects of this 'introspective' social learning appear to be:

1. Learning to build personal resilience prior to a disaster. Examples of this type of learning are found at <http://www.boingboing.org.uk/>
2. Business continuity planning and associated learning.
3. Social capital formation and learning. Social capital has been defined as the 'networks, norms, and social trust that facilitate coordination and cooperation for mutual benefit' (Putnam, 1995). Research into the recovery after the 2004 Indian Ocean tsunami (Aldrich, 2011), Hurricane Katrina (Boettke et al, 2007) and other disasters (Aldrich, 2012) has shown the benefits of social capital in providing resources for a faster and more efficient recovery.

A summary of the potential content of LfDR resulting from the exploration is provided in Figure 4 with the hazard-related components on the left and the host components on the right. As noted above a further component would be learning about climate change and adaptation for the hydrological hazards such as floods.

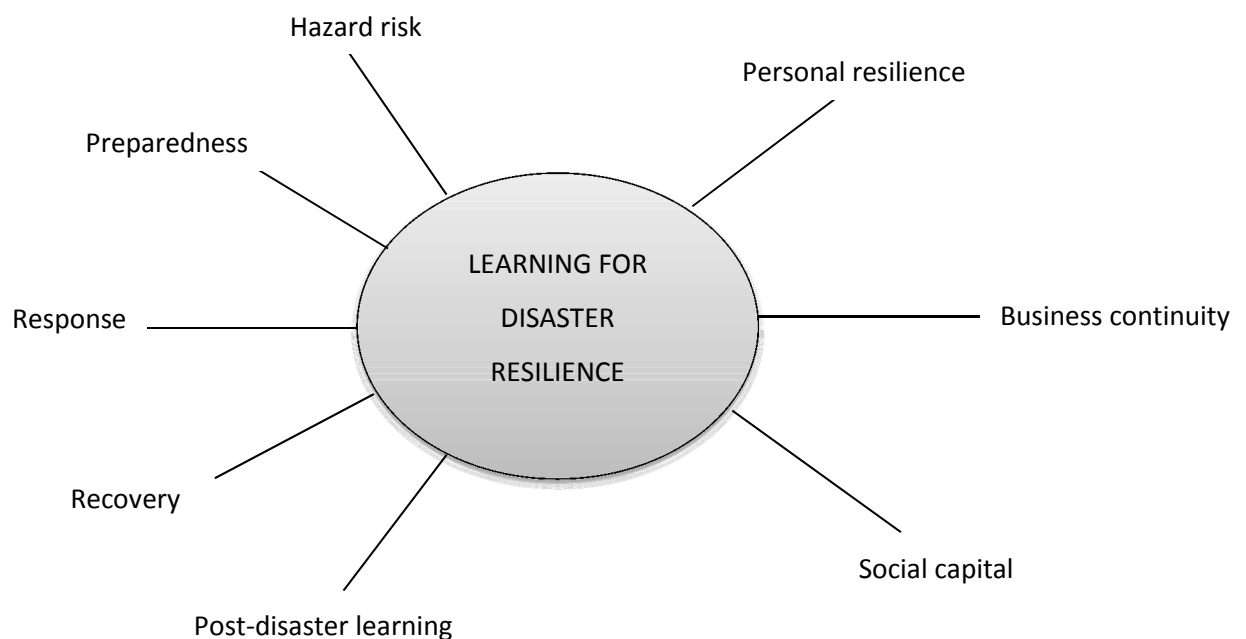


Figure 4: Potential scope of content for LfDR

Process

The exploration into the process component of disaster resilience learning identified eight main learning theories and teaching approaches (or pedagogies) in the four main learning domains that are gleaned from disaster psychology and sociology. These, along with examples of relevant learning activities, are summarised in Table 1.

Table 1: Summary of relevant disaster resilience learning theories and activities

Learning domains	Theory/Pedagogy	Relevance	Learning activities examples
Behavioural	Programmed instruction	Rehearsing behaviours required prior to a disaster	Drilling, exercising, training
Cognitive	Information processing	Disaster information needs to be processed to trigger appropriate behaviours	Warning messages, social media, media releases, signage, crowdsourcing
	Gestalt	Risk perception, decision-making, attention, memory and problem-solving are all important requirements for appropriate disaster behaviours	Awareness-raising documents and web sites (e.g. risk, preparedness actions), role plays related to disaster scenarios, maps
	Constructivist	People construct learning from disaster information and experience	Oral histories, social media, diaries, personal research
Affective	Experiential	Prior or learned experience is an important factor in people's disaster preparedness and resilience	Gaming, simulations, virtual reality training, exercising
	Social and emotional	Emotional factors play an important part in people's preparedness and resilience	Workshops, social and emotional learning programs in schools, resilient therapy, social media, counselling
	Transformational	People may need to change to prepare appropriately for future disasters	Role playing, disaster case studies, mind exploration, critical reflection
Social	Situated learning/communities of practice	Social capital has been shown to be a major factor in community resilience	Social media, post-disaster community meetings, resilience forums, community engagement

Discussion

Implications

According to Reiter (2013, p. 8), 'exploratory studies allow us to think, not just to measure; to use our imagination, experience, insight, and skill to propose new and innovative ways to understand and interpret reality'. This has been attempted in this research to help scope a possible LfDR approach. However, a weakness of exploratory research is that it provides no definitive answers; thus, the research described above requires further confirmatory research and testing in a range of communities.

With that limitation acknowledged, there are several potential implications of this research for emergency agencies and other organisations involved in emergency management. The research found that LfDR content should not only cover preparedness and recovery aspects, but also learning about improving recovery for people, organisations (e.g. businesses) and communities. It found that disaster resilience learning should also involve learning about the community itself, including how to reduce vulnerabilities and strengthen resilience by capacity building (e.g. social capital formation).

In relation to Figure 4, all LfDR content should be planned prior to a disaster (as far as possible). However, climate change adaptation learning (if relevant), disaster risk learning and disaster preparedness learning should be implemented before an event; disaster response learning during and immediately after an event; and, disaster recovery learning and post-disaster evaluation learning after an event. The introspective societal learning should be conducted prior to and soon after a disaster (as part of post-disaster evaluation).

Figure 4 enables specific LfDR content to be scoped for each potentially impacted community to help build disaster resilience. This can be achieved by unpacking the learning content segments from Figure 4. For example, the disaster preparedness learning segment in Figure 4 could be unpacked to provide the content shown in Figure 5. Further unpacking can be conducted of these sub-segments (e.g. of 'precautions' in Figure 5) to start to tailor content to the needs of specific communities including those affected by floods.

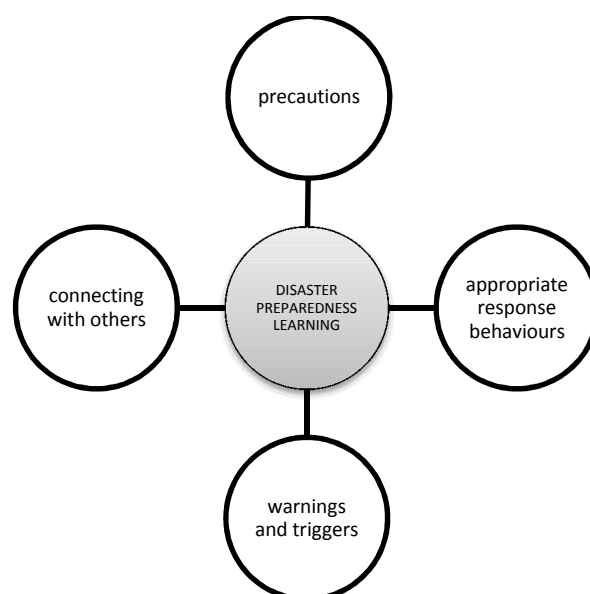


Figure 5: Possible unpacking of disaster preparedness learning content

The other part of the exploratory research involved exploring disaster resilience learning process. Opportunities for disaster resilience learning were identified in four broad learning domains – behavioural, cognitive, affective and social.

An observation from the research is that emergency agencies tend to rely primarily on information provision in relation to other opportunities (Table 1). This may limit effective learning due to the possible lack of people's motivation to seek disaster information and the one-dimensional, top-down manner in which it is delivered (Dufty, 2008). The implication of this is that emergency managers should utilise a variety of learning activities including across those listed in Table 1.

Also, there has been a large amount written about the role of social media in emergency management (White, 2012; Gupta and Brooks, 2013). Table 1 supports the use of social media by identifying its potential to assist widely across three of the broad domains of disaster learning – cognitive, affective and social.

A design framework for LfDR

There are numerous design frameworks to prepare community education programs. Using these frameworks and the findings of an LfDR pilot delivered in flood-affected communities in western Sydney (Molino Stewart, 2012), the following design framework (Figure 6) is promoted to develop community LfDR plans and programs.

In reference to the suggested design framework (Figure 6), as noted above LfDR principles have been previously identified. The focus of this exploratory research was to establish possible 'palettes' of learning content and process (shaded in Figure 6) which then can be 'filtered' through a series of considerations to develop tailored and appropriate community LfDR plans and programs.

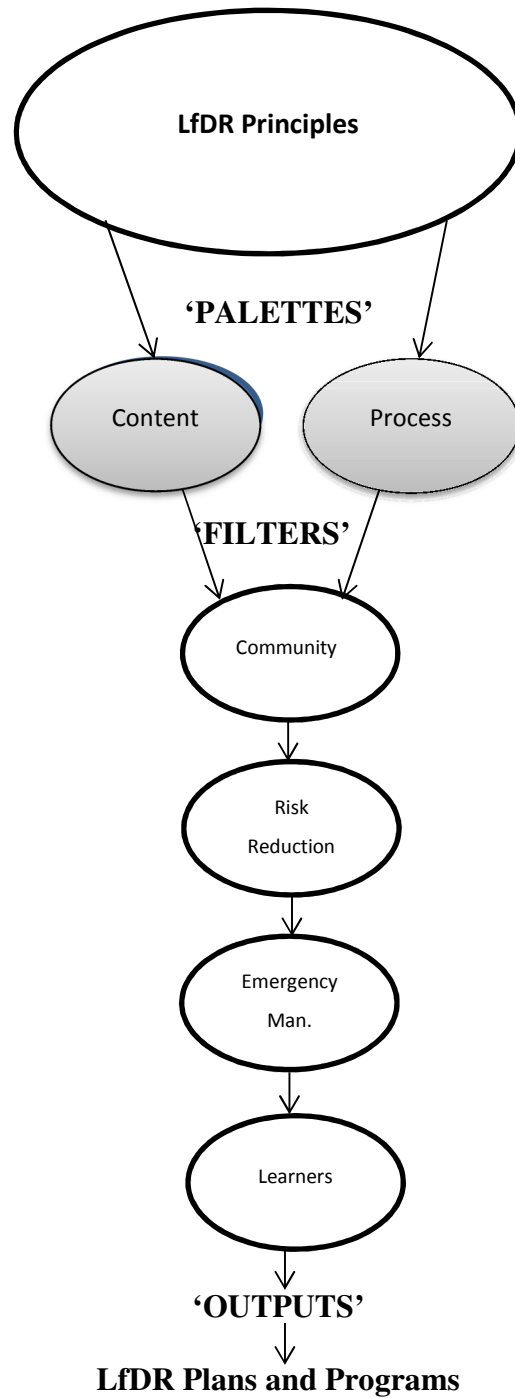


Figure 6: Suggested framework to design LfDR plans and programs

Conclusion

This paper is a first attempt to explore and scope the content and learning processes that could be used in the LfDR approach as a refinement of, and extension to, current flood and other hazard ECE practices.

The research found that disaster resilience learning content should not only cover public safety aspects, but also learning about improving recovery for people, organisations (e.g. businesses) and communities. It found that disaster resilience learning should also include learning about the community itself including how to reduce vulnerabilities and strengthen resilience by capacity building (e.g. social capital formation).

The other part of the exploratory research involved looking at disaster resilience learning process. Opportunities for disaster resilience learning were identified in four broad learning domains – behavioural, cognitive, affective and social. The findings demonstrated that many current ECE programs are only using limited parts of this learning spectrum, although this would be significantly increased by further embracing social media as a disaster resilience learning medium.

It should be noted that there are several major disaster ECE programs around the world that demonstrate aspects of LfDR as identified in this research. For example, 'Resilientville' (<http://resilientville.com/learn.html>) is a community learning activity that covers a large part of Figure 4 and several of the learning theories (e.g. experiential, social, transformational) listed in Table 1.

Resilientville is a role-playing exercise which advances participant awareness of the short and long term benefits of problem solving at the neighbourhood level. By working together as a community on issues that present themselves on a daily basis, residents develop crucial decision making skills and relationships that over time strengthen their ability to respond to a wide variety of unforeseen challenges and opportunities.

However, as shown in Table 2 this exploratory research highlighted some potential differences between most current flood ECE plans and programs and the emerging LfDR approach.

Table 2: Differences between current flood ECE programs and the emerging LfDR approach

FOCUS	CURRENT PREPAREDNESS ECE	LEARNING FOR DISASTER RESILIENCE
Goals	public safety, property protection	resilience
Scope	preparedness and response	across PPRR plus post-disaster learning
Legitimacy	communications, public participation	education, psychology, sociology
Preparation sought	emergency plans	individual resilience-building, business continuity planning, social capital formation
Program design	emergency services organisations	participative with communities
Implementation	mainly top-down	through partnerships and networks
Methods	mainly information-based, engagement techniques	mainly experiential, social, affective learning
Learners	audiences and target groups	participants, stakeholders and partners
Technologies	mainly websites	multi-modal including social media
Externalities	little dialogue about climate change etc.	linked to sustainability and climate change learning
Evaluation	at times, by providers	regular formative and summative evaluation with communities

As exploratory research provides no definitive answers, further confirmatory research and testing is required of this embryonic Lf DR approach in a range of communities including in developing countries.

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