Review Article

Perspectives on education, children and young people in disaster risk reduction

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ABSTRACT

This article presents a synthesis of education focused disaster risk reduction (DRR) literature. Our aim was to understand the landscape of DRR with a focus on education, schools, children and young people. A review of 40 international reports and peer-reviewed academic journal articles published between 2003 and 2014 across a range of disciplines health, urban planning, public policy, and emergency management, and a range of intergovernmental, international aid and Non-Governmental Organizations (NGOs) examine various aspects of education related DRR activities. The corresponding analysis identifies common themes across the multi-disciplinary literature as well as several gaps in research about education's role in DRR highlighting the complexity of DRR research, which reflects the multiplicity of purposes, audiences, and social and political perspectives they represent. The article concludes with recommendations for future research.

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Contents

1. Introduction

Disaster Risk Reduction (DRR) crosses multidisciplinary boundaries from fields such as health, urban planning, public policy, education and emergency management, and is the purview of a range of inter-governmental and non-government

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organizations (NGOs). Research from each field represents a range of different expertize, as well as varying purposes, audiences and goals. For instance, organizations, such as NGOs, collect data and produce publications to inform their constituencies and the public. As such, these organizations are often consumers rather than producers of DRR research, whose aim lies largely in promoting and guiding future actions in their respective fields amongst their primary audiences.

This review of selected international DRR literature focuses on publications relevant to education's role in DRR. The series of reports and academic peer-reviewed journals examined as part of this review reflect the diversity of DRR research related to education, children and young people. We begin by outlining some of common definitions and frameworks found within the selected literature as a means of introducing readers to some of the key concepts employed in our discussion of education focused DRR literature. Further contextualization of the literature lies in the discussion of the unique economic, social and environmental contexts of disasters. The corresponding analysis and discussion provides an overview of some key issues and trends in education focused DRR research. The second part of the discussion shifts towards identifying some of the existing gaps in research about the role of education in DRR. We conclude with a discussion of potential areas for future development, particularly for education focused DRR initiatives.

2. Background

2.1. Definitions

Disaster Risk Reduction has emerged as a growing area of emphasis within the field of disaster and emergency management [7]. Its multi-disciplinary nature highlights the complexity of the field and presents the challenge of its own definition. Multiple definitions and uses of the term DRR were found within the selected literature. For instance, the NGO ActionAid describes DRR as a "relatively new concept that focuses on three key areas: preparedness, prevention, and mitigation" ([1], p.1). Within academic settings these three areas are often associated with natural hazards such as climate change [2], earthquakes [18], fire, earthquakes, floods, tsunamis [9], and cyclones [39]. At a broader level, the World Meteorological Organization, a United Nations special agency, defines DRR as a "conceptual framework of elements aimed at minimiz[ing] vulnerabilities and disaster risks throughout a society, to avoid (prevention) or to limit (mitigation and preparedness) the adverse impacts of hazards, within the broad context of sustainable development" [43]. Meanwhile, the UNISDR defines DRR as:

The concept and practice of reducing disaster risks through systematic efforts to analyze and manage the causal factors of disasters, including through reduced exposure to hazards, lessened vulnerability of people and property, wise management of land and the environment, and improved preparedness for adverse events ([35,37], p.10).

We employ the UNISDR definition of DRR in this article due to its prevalence within the selected literature and its focus on an ethic of prevention [43].

2.2. Frameworks and models

The existence of multiple DRR approaches, frameworks, and models is a related challenge. Numerous frameworks, representing different foci and goals were found across disciplines, and academic and NGO circles. For instance, the International Federation of Red Cross and Red Crescent Societies [13] presents a community

based humanitarian protection model as a form of prevention. Their protection or 'egg' model is particularly relevant to individuals and families displaced by natural disasters. Related discussions of vulnerability and protection assists to empower communities to engage in the development of prevention strategies to mitigate insecurities and stress (environmental, social, and personal) associated with recovery. The model encompasses three types of action: "responsive, remedial and environment building with an emphasis on the latter which seeks to foster a political, social, cultural, institutional and legislative environment that enables or encourages the authorities to respect their obligations and the rights of individuals" ([13], p. 65). Plan International [21] has developed a child-centered DRR approach through their Safe village disaster preparedness model. Using the example of flooding in South Vietnam, the model focuses on incorporating the unique knowledge and experience of children in their local environment, and their suggestions on mitigating floods. Long-term outcomes include minimizing the economic impact of property and production losses and overall improvements in community well-being. Enhanced information, awareness, knowledge and disaster preparedness operationalized at local, national and international levels are advanced as actions necessary to successfully achieve these long-term goals. Gibbs et al. [11] present a third child and community based 'Ecological' DRR model. The authors describe their ecological or community based health approach as one that "recognizes the interplay between an individual's health behaviors and outcomes and the multiple layers of influence from their physical and sociocultural environment" (p. 17). The contextual nature of the disaster and the individual and community responses to it are central to this approach. The Japanese Education for Sustainable Development (ESD) framework uses a tsunami and earthquake disaster prevention strategy [30]. The ESD framework illustrates how strong partnerships with community, city government and national level agencies are central to achieving the goal of extending natural awareness to communities through a range of school based and community oriented initiatives.

Numerous national DRR frameworks are also in place but the UNIDSR's Hyogo Framework for Action (HFA) remains one of the most commonly cited (UNISDR, n.d.a). Prevention, preparedness, and education with the aim of fostering a culture of safety and resilience are central to the HFA. Meanwhile the HFA's scope for national and local implementation align with its goal of reducing social, economic and environmental losses in disaster contexts. The HFA's prominence across sectors may also reflect its development in consultation with governments, international agencies, disaster experts and community groups.

2.3. Economic, social, and environmental contexts

The complexity of making sense of multiple DRR approaches across various disciplines, definitions and frameworks is further complicated by the unique economic, social, and environmental contexts of disasters. Mitigation of the potential social, economic and environmental impact of disasters is evident within many international community DRR frameworks. While the economic impact of disasters is a prominent feature within the literature, measures of social and personal well-being are also important areas of DRR research [13]. For example, the UNISDR HFA seeks to reduce the social, economic and environmental losses in disasters at local and national levels. Similarly, the International Federation of Red Cross and Red Crescent Society's protection model frames the economic and social impact of disasters through discussions of reducing insecurities and stress encountered by individuals and communities post-disaster.

The historical and environmental context of disasters also becomes visible in a geographical analysis of DRR research. Whilst

Table 1
Program of research overview.

Research program	Prevention and Planning	Disaster Management	Education
Timeline **Foci and emergent trends**	Pre-disaster Prevention logistics, such as the strategic use of resources, infrastructure, facilities to mitigate risk Trends: Communication and dissemination of knowledge at local, national and international levels	Post disaster Recovery logistics, distribution of resources, communication plans moving forward Trends: Resilience, health, child-led DRR	Pre and post-disaster Disruption of learning Knowledge creation and dissemination Trend: Goals of long term community safety awareness and resilience

many disasters occur across the world, particular regions and countries are prone to specific types of natural disasters. The Pacific region encounters floods, tsunamis and earthquakes; a varied North American climate makes it susceptible to a range of natural disasters including cyclones, hurricanes and avalanches amongst others. Earthquakes, landslides, and thermal extremes occur across Europe; and droughts are a concern in many African countries. The recognition of context locates DRR as an economic, social and environmental practice. Emphasis on context also makes two significant contributions to this analysis of literature. First, it identifies the importance of understanding local and national contexts, which arguably informs different DRR approaches, strategies and goals. Second, context becomes a useful organizational tool to categorize DRR research.

3. Methods

3.1. Selection of DRR research

This selected literature review includes a range of academic, NGO, and privately funded DRR research published between 2000 and 2014. It was important for us to present a literature review inclusive of different voices within the DRR community. With an emphasis on research and reports from 2010 to 2014, this time-frame coincides with an influx of major natural disasters that occurred in 2011 such as the New Zealand earthquakes, the Japanese triple disaster and mass flooding in the Philippines, which had devastating long-term effects for these nations [10,32].

3.2. Selection and analysis of DRR research

At the broadest level, our aim was to understand the landscape of DRR with a focus on education, children and young people. In more detail, we sought to identify any emergent trends, themes, and initiatives specific to education's role within the field. A third aim was to then identify and discuss potential gaps in the education DRR literature. The research in our review extends across international contexts, disciplines, and types of disasters. This process involved a targeted search for research and reporting on natural disasters in peer-reviewed academic journals, policy papers and incident specific reports from international NGOs. All literature was publicly available in hard copy or online either through library journal access or on organization's websites.

The scope of the initial search yielded a wide variety of sources, which were later reduced to a total of 40 relevant policy, research, intergovernmental and NGO reports for deeper analysis. Varying in breadth and depth, the studies were selected for their emphasis on education, and children and young people in relation to prevention and disaster management. The iterative review and analysis of the literature led to the identification of key topics and themes within education focused DRR, and disaster management and prevention and planning associated with children and young people.

4. Results

4.1. Areas of research

As mentioned, DRR research has emerged in response to the economic, social and environmental context of disasters. The analysis of selected literature locates the studies into three key programs of research which have been used to structure this analysis and discussion of the selected DRR literature: (1) prevention and planning; (2) disaster management; and (3) education focused studies. Table 1 is a visual representation of each strand of research. Reading from top to bottom the programs are situated at the top level, followed by the timeline in which they typically occur, and the bottom level of the figure lists emergent trends identified within each research strand.

4.2. Analysis of areas of research

Influenced by these programs of research, prevention and planning studies tend to include much of the international community's reporting on natural disasters. Discussions within this line of research tend to focus on practical and logistical concerns such as infrastructure and basic services [5,40]. Infrastructure such as road use, facility management of evacuation routes and buildings, industrial buildings and schools were raised as important considerations in the planning and prevention process [23,25]. For example, the Indonesian based policy think tank Institute of Risk Governance Council (IRGC) publishes numerous DRR planning and prevention reports at local and national levels. Their reporting notably includes discussion about the dissemination of DRR knowledge such as community farming practices through stakeholder identification, community capacity building and action (knowledge), and planning [15], and, at the broadest level, access to DRR knowledge, training and education materials [17].

Communication measures are a second area of focus within prevention and planning discussions. Early warning systems, and coordinating DRR and management efforts with the private sector in conjunction with discussions at national, regional and local levels [3].

A focus on practical initiatives is also found within disaster management research. While the emphasis shifts to post-disaster initiatives, discussions of practical actions/solutions/responses are common to this strand of DRR. Recommendations include the distribution of funds and connecting policy and practice at national and local levels [3], strengthening the international response systems inclusive of managing causalities, debris removal and economic damages [10], displaced people [13], longer term economic impacts or resilience [16,24], and making stronger policy, regulations and practice connections [17]. Recommendations tend to closely parallel the specific contexts and types of disasters.

Subthemes emerged as additional trends within the disaster management research strand. Recurring discussions of health and resilience [6], and increasing references to the role and influence of children in disaster contexts [21,27]. Child-led, child-centered or child-focused DRR identifies children's particular vulnerability and

social and emotional wellbeing needs in disasters [31]. Studies within this strand of research underscore the importance of children's preparedness and inclusion in DRR practices and policy [41]. Yet another line of research emphasizes the importance of children as DRR ambassadors. Children have strong potential to raise DRR awareness, increase community knowledge and therefore make significant long-term contributions to the resilience of communities [2].

The focus on children in disaster contexts is closely associated with DRR education focused research. This third strand of DRR is unique for several reasons. First it is positioned as a sector that is both deeply impacted by disasters yet also holds considerable influence on DRR prevention and management. As Mitchell [16] explains, the impact on schools and education are significant. Access to schools can be minimized due to physical and environmental hazards. When accessible, schools are often centrally placed within a community to be used as emergency management sites – often as shelters or communication centers. Learning can also be diminished in multiple ways through loss of staff and learning days, and by the social and emotional impact on staff and students. Secondly, DRR education is incorporated into the HFA framework. Priority action number three seeks to "use knowledge, innovation and education to build a culture of safety and resilience at all levels" [37]. In particular, DRR education contributes to the "dissemination of relevant knowledge and information on hazards, vulnerabilities and capacities" [37]. Third, DRR education offers the potential for sustained knowledge creation and dissemination from primary through to tertiary settings, and to the wider community. School based DRR education is also attributed to the long-term resilience and empowerment of the community.

5. Discussion

5.1. Interrelated economic and social well-being implications

The overview of three programs of DRR research found within the selected literature lays the foundation for further analysis of some key acknowledgments within the field and identified gaps in research. Evidence of underlying acknowledgments about the economic and social well-being of communities is present across all three programs of research. Some research is more explicit about making the link between DRR and economic and social implications of disasters. Examples of both are plentiful within UNICEF's 2013 report on the impact of climate change on children [33]. Terms such as 'cost', 'economic burden' and 'economic resiliency' along with dollar figure statistics ($68 million for Hurricane Sandy in America) directly address the financial impact of disasters. The report also examines the long-term human or social cost of disasters through references to health and education sectors that contribute to life opportunities and the greater 'intergenerational impact' of disasters on children and young people.

Child poverty is another economic concern identified within some DRR research. Save the Children, for example, states how climate change disasters can be "major barriers to poverty reduction" ([27], p. 3). The report highlights the multi-dimensional political, economic and social impact of disasters on children and stands out for this reason. Discussions of poverty appear elsewhere in Save the Children reporting. In the organization's Humanitarian Toolkit report, the issue of poverty is raised again, this time by emphasizing the disproportionate impact of disasters on poor and vulnerable members of society [3]. Other research [16,32] takes a different approach to poverty by positioning poverty as a disaster related outcome that can be mitigated through education strategies.

The social impact of disasters is the other key concern raised

within the selected DRR literature. Emphasis on the social implications of disasters tended to be more prevalent in climate change, child-focused, and education DRR studies. Further analysis suggests that the political and philosophical goals of DRR organizations and funders may influence the positioning of social outcomes within the research. For instance discussions of social outcomes are central to DRR research and reporting amongst many well-recognized organizations and NGOs such as the UNISDR, Action Aid, UNICEF and Plan International. Mission statements and organization mandates offer evidence in support of this claim. The UNISDR's disaster reduction mandate is to coordinate organizations and activities in socio-economic and humanitarian fields ‖ [38]. Similarly, UNICEF's mission and disaster reduction has a similar goal to protect, children's rights…and to expand their opportunities to reach their full potential [34]. Both examples illustrate the influence of the organizations' politics, philosophies and mandates on the field of DRR.

The economic and social implications of disasters are fundamental concepts in DRR research. However, we raise several questions about how economic and social consequences are discussed within existing DRR studies. The first critique concerns the trend of discussing the two concepts separately as discussed in the previous section. Instead, we suggest that the economic and social costs of disasters are more interrelated than the literature reflects.

Some studies do signal a stronger relationship between financial and humanitarian costs by presenting a range of quantitative and qualitative data. Quantitative data are often statistics about poverty, regional economics, and natural and human hazards. The UNISDR's HFA report [17] offers an example of a joint discussion of economic and social DRR related costs. References to the "destruction of nationally critical economic assets" are balanced by comments about mortality rates and building community and national resilience to disasters. The potential emphasis on economic over social costs is a second critique. The literature reveals how financial costs are often placed in advance of discussions of the human costs of natural disasters. It is possible that this ordering is unintentional; however, it is a trend within the selected literature. To reiterate our viewpoint, enduring social ramifications for individuals, communities and nations do have financial costs attached to them that can extend well beyond immediate financial losses. As Ferris explains, "missing out on education and suffering long-term health effects can impede a country's development efforts" ([10], p. 75). A stronger example of the interrelationship between economic and social DRR consequences is found within Action Aids [1] climate change report. This report presents case study data discussing how DRR initiatives can simultaneously improve economic, social and environmental conditions. The transition from hunting to farming as the primary industry was transformational for one Ghanaian community. This shift in practice increased economic opportunities from selling produce, was more inclusive by enhancing participation in farming practices amongst all members of society, and contributed to reduced bushfire risks associated with hunting.

5.2. Child-led DRR initiatives

Building on the concept of enhanced social participation, a growing number of DRR studies focus on the voices of children. Child-led DRR literature reports on various aspects of prevention, management and education. Common themes are child welfare and development [28], various aspects of health [6] and child protection and participation in DRR initiatives [27,41]. Plan International [22] has even developed a child-led DRR toolkit outlining goals, outcomes and change indicators. Inclusion and protection are the two recurring messages throughout the document. Plan International's report stands out because of its emphasis on

democratic goals, such as citizenship. Save the Children reports underscore the importance of child protection [26,27,41]; however, one in particular, offers a fresh approach to child focused DRR field. This document reports on the process of researching and reporting of disasters *with* children as opposed to researching *about* them [41]. Inclusion, participation and empowerment of children are central tenets of this work. The section on research methods and tools demonstrates the strong link between child-led and education DRR.

Several factors contribute to the rising interest in child-led DRR research. Demographic statistics are one of them. Large populations of children in some countries such as Bangladesh, Nepal, the Philippines and Indonesia, amongst others, support the emerging interest in child-led DRR [5]. The potential for children to be active citizens and agents of change also contribute to greater value to be placed on enhancing their skills through active DRR programming [28]. Related positive outcomes include greater visibility of children within their communities and strong long-term resilience to disasters. UNICEF [33] presents an equity-based approach to child-led DRR in which child welfare is framed as an inter-generational concern. The vulnerability of children, and lack of representation are identified barriers across the three research programs. Back, the author of UNICEF's *Taking Stock* report, argues that "children's disproportionate share of the impact, both in the immediate and long-term is a third factor that directs further attention towards child-led DRR" ([2], p. 8). Building human rights knowledge and lifelong skills are suggested as factors that contribute to the development of a culture of DRR prevention.

We raise several issues regarding gaps in child-led DRR research. A key concern relates to the lack of data about the protection of children. Numerous reports [3,10,13] identify children as a particularly vulnerable population; however, statistics or specific policy about child protection was scarce in the literature we canvassed. Equally absent was further information concerning the type and length of assistance provided to children, and number of child deaths, displacements and forced migration statistics [13]. The Red Cross advocates for more policy protection measures for people displaced by disasters. They suggest a right-based approach to help protect citizens. A second related gap in DRR research is the largely absent voices of other vulnerable populations such as women, the elderly, individuals with disabilities, and ethnic and religious minorities [3,10]. We identified minimal references to the needs of culturally and linguistically diverse, and indigenous populations within the selected literature [24]. Like children, seniors and people with disabilities have specific assistance needs, often have limited incomes, and have limited visibility and political influence within their communities. We place this concern alongside child-led DRR issues as greater prominence given to one vulnerable group may raise awareness of others.

5.3. DRR education initiatives

School-based DRR programs seek to raise awareness and knowledge of DRR activities.

As Wisner [42] explains, school based education DRR often falls into hazard and risk reduction, and school capacity and protection from natural hazards. School curricula about disasters are characterized by topics such as school and student preparedness, response, recovery and resilience [19,36,37]. Practical teaching and learning activities in this line of research promotes identification of hazards, available emergency equipment, and mock drills. The International Finance Corporation's (IFC) (2010) disaster preparedness and management handbook for schools is representative of the aims of many school-based DRR programming. Their handbook and activity guide has three goals: "protect students and staff from physical harm; minimize disruption and

ensure the continuity of education for all children; [and] develop and maintain a culture of safety" (p. 3). Meanwhile, school-based response and recovery programming tends to focus on the activation of plans and resources which involve communication with local, national and international agencies [9].

Three topics for further discussion emerge from our analysis of school-based DRR programing. The first mirrors an earlier discussion point from the analysis of child-led DRR research regarding the minimal presence of particular voices from school-based DRR studies. In this case, most studies in this literature focused on children and schools, and family and community members.

A limited number of studies discuss the role of principals, teachers and other school staff. Wisner [42] discusses this phenomenon as the 'bottom up' DRR approach, which he suggests, is far less prevalent than 'top down' approach from government and NGO directives. Two reports in our literature review discussed the teachers' delivery or implementation of DRR plans. Swiss based NGO, Seeds describes a practical training program for teachers in the areas of disaster management, earthquakes, landslides, floods, structural safety, school disaster management and evacuation planning, first aid, search and rescue skills and psychosocial support skills [29]. Ozmen's [20] research examines how school principals and teachers are prepared to respond to earthquakes in Turkey. The key finding from this study is that school staff were relatively unprepared to respond to earthquakes resulting in Ozmen calling for further training for all school staff. We suggest that teachers, principals and other school staff are critical to children's learning; therefore, their inclusion in school DRR programs is highly beneficial to school disaster prevention and responses strategies. Parents are a second group that receives little mention within DRR literature. Redler (2008) offers one example in the US context that signals a clear lack of preparedness (45% of survey participants) and lack of parental willingness (63% of parents) to follow community DRR plans about collecting their children from school during disasters. This finding supports our argument in favor of greater inclusivity amongst school stakeholders, such as parents, in school-based DRR programs.

The second point of discussion is the prescriptive tone and language used within school-based DRR research. Words such as 'should' are common. Comments appear, such as: "classrooms should be equipped with 'jump-and-go' folders that contain emergency contact information, individual health plans, name tags, and other critical information for all students, particularly the youngest ones" ([8], p. 897). Other examples include – damage should be repaired as discovered, and structural safety should not be compromised through alteration and misuse (IFC 2010 disaster emergency guidebook p. 15). Use of terms such as 'guidelines' and 'handbooks' [12,14,22] are employed frequently within school-based DRR reports. Some reports include various school checklists. A sampling of IFC checklists in their *Disaster and Emergency Preparedness: Guidance for Schools* report includes: school disaster readiness and resilience; school building safety, and a family disaster plan. The concern here is the didactic nature of such reports which may not allow for the flexibility required to be adapted to each unique school, disaster and country contexts.

The third topic for further discussion relates to unknown data about school-based DDR connections to national and/or local curriculum. Brown and Dodman [5] call for efforts to integrate learning about DRR into national and local curricula (p. 16) however, it remains unclear how many any organizations or governments have responded to this call. We found few examples within the selected literature reported here. Bolton's [4] Department of For International Development and UK Aid report for India, for example, indicates that disaster management has been integrated into the social science curriculum covering topics such as hazards, natural and man-made disasters, and community preparedness.

On a similar note, it remains unclear how many schools use or are likely to implement the available school-based DRR program guidelines, handbooks, checklists and toolkits in the future. Available data in these areas would be useful in further developing school-based DRR initiatives.

6. Conclusion

This paper presents an overview and analysis of a selected body of international DRR literature related to education, children and young people. The iterative analysis identified emergent trends, themes and education-focused initiatives, in addition to current tensions and gaps in research. Identified tensions and challenges raised questions about the development and use of varied terminology, models and frameworks. One area for further consideration is for the potential development of shared language and collaborative approaches such as the UNISDR HFA, which may bring some level of uniformity to education, focused DRR programs involving children and young people.

Education DRR research also reinforces the unique context of the disasters and communities they impact. Schools emerged as focal points in the community post-disaster as well as important sites of knowledge in prevent and planning. With reference to school-based programming the issue of missing data or minimal information about the uptake of school-based guidelines, handbooks, and programs is one area offering opportunities for further development and research. Looking forward there are opportunities to raise levels of representation and inclusivity within education focused DRR to extend to other vulnerable groups such as children not attending school, the elderly, women, cultural and ethnic groups, and individuals with disabilities.

Several tensions and challenges were discussed in our review of literature. We raised questions regarding the development and use of varied terminology, models and frameworks. We suggest there is further potential to develop shared language and collaborative approaches such as the UNISDR HFA that brings some level of uniformity to DRR programing. We also signal the importance of representation and inclusivity within the field. We discussed rising interest in child-led DRR with the aim of extending this interest to other vulnerable groups such as the elderly, women, cultural and ethnic groups, and individuals with disabilities. With reference to school-based programming we raised the issue of missing data or lack of information about the uptake of school-based guidelines, handbooks, and programs. It is also unclear which DRR study recommendations have been taken forward or implemented. To address these concerns, further education DRR research focused on the development of strategies to maximize the potential role of education, schools, children and young people would likely have strong positive outcomes for communities impacted by disasters.

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