

**Institutionalization of Education
for Effective Disaster Risk Reduction in Uttarakhand, India**

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Institutionalization of Education for Effective Disaster Risk Reduction in Uttarakhand, India

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Key Words: Disaster risk reduction education, Institutionalization of education, formal education, non-formal education, informal education, Uttarakhand

1. BACKGROUND AND OBJECTIVES

The role of disaster risk reduction (DRR) education is recognized as important to build a resilient society. Various types of DRR education are implemented by various stakeholders and those practices are categorized into three: formal, non-formal and informal education. Formal education is delivered through the school curriculum by an educational authority while non-formal education is delivered outside of the curriculum by a non-educational authority. Informal education indicates the unintentional learning through daily life. The research aims to suggest the synergetic implementation of three modes. The research was conducted in the state of Uttarakhand, India, a state that is prone to natural disasters, where different types of DRR education are held.

2. METHODOLOGY

The research adopted four methodologies: literature review, semi-structured and unstructured interviews, indexing and focus group discussion. The author developed Institutionalization Indexes of Disaster Risk Reduction Education (IDRE), which consists of 165 variables. The indexes applied for one urban and one rural district in Uttarakhand.

3. RESULTS

Analysis of interviews and IDRE showed that synergistic implementation of DRR education in curriculum, co-curricular activities and teachers' training occurred despite the weak policy. These were all achieved through the cooperation between department of education and DRR related authorities, while the weakness in school disaster risk management, structural and non-structural safety of school was identified. Formal and non-formal DRR educations' content is transferred from students to family in informal modes of education. Local knowledge to predict rainfall and surface erosion was also identified in the study.

4. CONCLUSION

Through the research, an approach for analyzing three modes of DRR education and a framework for institutionalization of DRR education were created. The framework was described from DRR education at school, school disaster risk management and platform of stakeholders. It is suggested that multi-stakeholders' cooperation be promoted in order to incorporate DRR contents into education. School Management Committee can promote better school disaster management with the participation of community members. The local knowledge should be validated scientifically and utilized as a tool of DRR education in formal and non-formal education. Finally, use of media is also important factor for knowledge transfer. Thus, three modes of education should be synergistically implemented and the framework should be applied to other areas.

インド・ウッタラカンド州における防災教育の制度化に関する研究

中野 元太

キーワード：防災教育、教育の制度化、フォーマル教育、ノンフォーマル教育、
インフォーマル教育、ウッタラカンド州

1. 研究の背景と目的

防災教育は災害に強い社会を形成する上で重要である。様々な防災教育が様々なステークホルダーによって実施されているが、これらの教育は大きくフォーマル教育、ノンフォーマル教育、インフォーマル教育の三つの形態に大別できる。フォーマル教育とは政府の教育機関がカリキュラムを通じて学校にて行う教育を指し、ノンフォーマル教育とは学校カリキュラムの外で政府の教育機関以外の組織が行う教育を言う。またインフォーマル教育とは日々生活を送る中で無意識的に学ぶことを指している。本研究ではこれら三つの教育形態がどのようにすれば相互作用的に実施可能かを提案することを目的としている。研究対象地として、災害常襲地であり様々な防災教育が行われているインド北部のウッタラカンド州を選定した。

2. 研究手法

本研究では、文献調査、半構造化及び非構造化インタビュー、防災教育の制度化指標（IDRE）、フォーカスグループディスカッションの四つを用いた。筆者は165の項目からなるIDREを本研究を通じて作成した。調査はウッタラカンド州の都市に位置する地区及び農村山に位置する地区の二つを対象に行われた。

3. 結果

調査の結果、防災教育を推進する政策的背景がなくても、教育局によって学校カリキュラムや課外活動、学校教員へのトレーニングの中に防災教育の要素が取り入れられていることが分かった。これらは教育局と州の防災機関や消防局といった防災専門機関との連携・協働によって達成されたものである。一方、学校防災管理や学校の建物の安全性においては課題が見られた。加えて、調査結果から生徒は学校での防災に関する学びを家族へ伝える傾向があることが分かった。また、調査を行った地域では大雨や土壌の表層崩壊を予見する知識が地域内で共有されていることが確認された。

4. 結論

本研究を通じて、三つの防災教育形態の分析アプローチ及び防災教育の制度化に関するフレームワークが提案された。本フレームワークは防災教育の実施、学校における災害リスクマネジメント、ステークホルダーのプラットフォームの三つの視点から説明されている。防災教育を学校カリキュラム、課外活動、学校教員へのトレーニングに取り込んでいくためにはステークホルダー間の連携・協働が必要である。加えて既存の学校管理委員会は地域住民の参加も規定しており、これは学校防災管理を学校管理の中に取り入れるとともに地域の災害への知見を踏まえることにもつながる。また、地域に根付く災害に対する知識が科学的に検証され防災教育に取り入れられることの必要性、そして防災の知識が伝達される上でメディアは重要な役割を果たすことを示した。これらを通じて三つの教育形態が相互作用的に行われることにつながる。また本フレームワークは他の地域においても活用されるべきである。

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List of Abbreviations

AWP	Annual Work and Plan
CBSE	Central Board of Secondary Education
Cedefop	The Office for Official Publications of the European Communities
DDMA	District Disaster Management Authority
DIET	District Institute of Educational Training
DM cell	Disaster Management Cell
DMMC	Disaster Mitigation and Management Centre
DRM	Disaster risk management
DRR	Disaster Risk Reduction
EOC	Emergency Operation Centre
FGD	Focus Group Discussion
HFA	Hyogo Framework for Action
ICSE	Indian Certificate of Secondary Education
IDNDR	The International Decade for Natural Disaster Reduction
ISCED	International Standard Classification of Education
NCC	National Cadet Code
NCF	National Curriculum Framework
NDMA	National Disaster Management Authority
NDRF	National Disaster Response Force
NEC	National Executive Committee
NIDM	National Institute of Disaster Management
NPE	National Policy on Education
NSS	National Service Scheme
NSSP	National School Safety Programme
RMSA	Rashtriya Madhyamik Shiksha Abhiyan (National Mission for Secondary Education)
RTE	The Right of Children to Free and Compulsory Education Act
SCERT	State Council of Educational Research and Training
SDMA	State Disaster Management Authority
SEC	State Executive Committee
SFDRR	Sendai Framework for Disaster Risk Reduction
SIEMAT	State Institute of Educational Management and Training
SMC	School Management Committee
SSA	Sarva Shiksha Abhiyan (Education for all)

Chapter 1. Introduction

1.1 Research background

The role of disaster risk reduction (DRR) education is highlighted by academicians as well as international communities in order to build resilient society. DRR education equips people with knowledge to make appropriate decisions in case of natural disasters (Petal, 2009). One example of the power of knowledge observed was in the Indian Ocean Tsunami that occurred in 2004. A British girl who visited a beach in Thailand alerted surrounding people after witnessing the signs of a possible tsunami, which knowledge she had learnt in her school (Shaw et al., 2011). Two international frameworks, the Hyogo Framework for Action (HFA) adopted in 2005 and the Sendai Framework for Disaster Risk Reduction (SFDRR) adopted in 2015, also suggested the important role of education to achieve a resilient society. Along with this background, various types of DRR education are implemented by various stakeholders in the world. Besides, people engage in some forms of knowledge transfer in daily life such as listening to knowledge shared among community members. The different types of educational modes can be categorized into three: formal, non-formal, and informal education. Formal education is delivered in the framework of a school by the educational authority of the government, while non-formal education is delivered out of school by non-educational authorities such as NGOs, governmental agencies, and so on. Informal education indicates the unintentional learning through daily life. Literatures suggest that synergistic implementation of three modes of education can enhance the effectiveness of education (Shaw et al., 2011; Tudor, 2013).

This research has been conducted in the state of Uttarakhand, India. The state of Uttarakhand is located in the middle portion of the Himalayan Mountains. Due to the collision of Indian and Eurasian plates and monsoon climate, the state has been affected by a number of natural disasters. A recent devastating disaster is known as the Uttarakhand disaster, which took place in 2013, consisting of flash floods and landslides induced by heavy rainfall. Thousands of precious lives were lost, and the education sector was also severely affected in various parts of the state. Since Uttarakhand is highly prone to natural hazards, various stakeholders are involved in DRR education, and formal, non-formal, and informal means of knowledge transfer may be observed in the state due to the frequent occurrence of natural disasters. Therefore, synergistic implementation of DRR education in the state of Uttarakhand is targeted for the research.

1.2 Research questions and research objective

This research aims to propose effective DRR education based on the idea of synergy among formal, non-formal, and informal education. Hence, the research will answer the question,

How can formal, non-formal, and informal education synergistically be implemented for effective disaster risk reduction?

In order to answer the question, the following points are studied,

- Practices of DRR education in two districts of Uttarakhand, Dehradun district and Rudrapur district according to the definition of formal, non-formal, and informal education

- Factors to promote the DRR education in each mode of education and its connection with different modes of education in two districts of Uttarakhand

1.3 Research methodology

This study adopts four methodologies, literature review, interview, indexing and focus group discussion (FGD) as shown in Table 1.1. The field surveys were conducted in Uttarakhand two times, from August 16 to November 18, 2014 and from September 2 to September 23, 2015.

Table 1.1 Research methodology

Methodology	Objective	Place	Targeted group	Date/term
Literature review	Define DRR education, three modes of education			
Interview	Identify practices of DRR education, challenges and factors for DRR education	State government, Dehradun, Rudraprayag	Government officers, school teachers, community members	From August 16 to November 18, 2014. From September 2 to September 23, 2015
Index	Identify practices of DRR education, challenges and factors for DRR education	Dehradun, Rudraprayag	Government officers, community members	From September 2 to September 23, 2015
FGD	Identify the issues in implementing DRR education	Dehradun, Rudraprayag	Government officers, NGO staffs	September 19, 2015 September 10, 2015

Literature review

Literature review was held in order to define the DRR education in academic and international context, define the formal, non-formal and informal education, and obtain the basic data of state of Uttarakhand as well as the institutions relevant to DRR education.

Interview

Semi-structured and unstructured interviews were implemented in order to identify the practices of DRR education according to formal, non-formal and informal education in Dehradun and Rudraprayag. Besides, positive factors and challenges of DRR education were extracted from the results of the interview.

Indexing

In order to identify the overall implementation status of formal, non-formal and informal DRR education, Institutionalization Indexes of Disaster Risk Reduction Education (IDRE) was developed. Based on the index, status of implementation of three modes of DRR education was studied, and positive factors and challenges of DRR education were extracted in Dehradun and Rudraprayag.

Focus group discussion (FGD)

FGD was implemented with the aim of identifying the issues that practitioners of DRR education face in the field. Therefore, the problem tree analysis was adopted and issues were examined while identifying the cause and effect of each issue. Six people in each district have participated at FGD and the participants were from government offices and NGOs involved in DRR education.

1.4 Research location

State of Uttarakhand is located in the northern-west part of India, sharing north boarder with China and east border with Nepal as shown in Figure 1.1. Dehradun district and Rudraprayag district were selected as study area because both of regions are prone to different types of natural hazards such as flood and earthquake. In addition, Rudraprayag district were the most affected by Uttarakhand disaster in 2013 among all districts of Uttarakhand. Besides, these two districts have different contexts. Dehradun district has Dehradun city, which is the state capital and urban area on plain land. On the other hand, Rudraprayag district is located in the middle of mountains and more than 99% of the district is categorized as rural area. Photos of overview of central part of two districts are shown in Figure 1.2.



Figure 1.1 Map of State of Uttarakhand
(Partially added by author to the map of Government of India, 2011)



Figure 1.2 Overview of central part of Dehradun district (left) and Rudraprayag district (right)

1.5 Structure of the thesis

This master thesis consists of seven chapters as shown in Figure 1.3. Chapter 1 focuses on the background, objectives of the research and study location. Chapter 2 describes the definition of formal, non-formal and informal education, and the definition of DRR education. Chapter 3 shows the statistical overviews of Uttarakhand, past disasters and institutions related with DRR education focusing on two studied districts. While Chapter 2 and Chapter 3 are the literature review part, Chapter 4 and Chapter 5 are developed based on the original data. Chapter 4 shows the DRR education practices based on the interviews, and positive factors and challenges of DRR education are explained. The results obtained through the interview gave input to Chapter 5 as well. Chapter 5 is the part for development of index, its application, and FGD to identify the status of implementation of DRR education in the state. Based on the literature review as well as the original data, synergetic implementation of DRR education is discussed and concluded in Chapter 6.

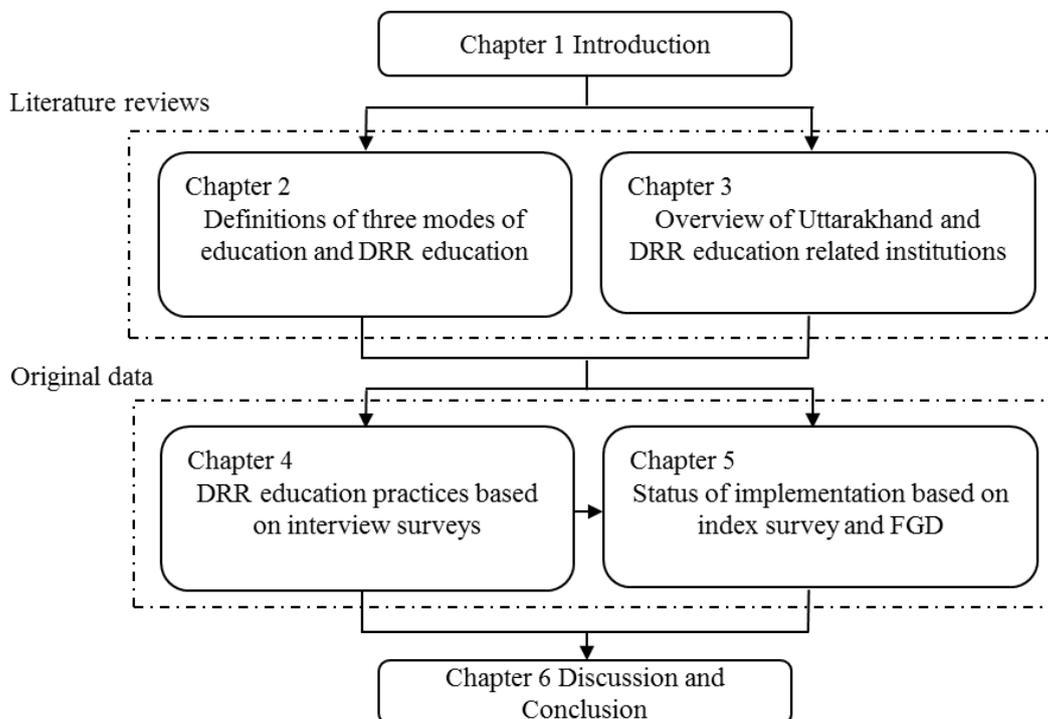


Figure 1.3 Structure of master thesis

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Chapter 2. Disaster risk reduction education

2.1 Concept of DRR education

There is no single and unified definition of education for DRR and different kinds of terms are used to express the education such as “disaster education”, “disaster risk education” and “disaster prevention education”. However all these terms are used interchangeably and they all mean DRR education (Shaw et al., 2011). Hence this study adopts the term DRR education. The other reason of using the term DRR is that the concept of DRR includes the aspects of prevention, mitigation and preparedness in accordance with the potential disaster risks (UNISDR, 2004). Thus, it covers both aspects of natural hazards and social environment, which viewpoint is fundamental for DRR education as indicated by Petal (2009). It is pointed out the DRR education should deliver the knowledge on natural hazards as well as the human interaction with natural environment since the impact of natural hazards can vary depending on human intervention to the environment.

UNISDR (2005a) explains the DRR education as “sharing and using information and knowledge in a productive way through awareness-raising and educational initiatives so that people make informed decisions and take action to ensure their resilience to disasters. It encompasses for more than formal education at schools and universities, and involves the recognition and use of traditional wisdom and local knowledge for protection from natural hazards”. This definition indicates that DRR education should give knowledge to let individuals make an appropriate decision in case of natural disasters and it refers to the use of local knowledge beyond the school education for ensuring people’s resilience to disasters. The term “resilience” has been described according to three dimensions, i) robustness, ii) rapidity and iii) enhancement (Mayunga and Peacock, 2010, p. 8). Robustness is a capacity to “absorb” and “resist” the impacts of natural hazards, rapidity is the ability in bouncing back to the original status before the disaster, and enhancement is to build capacity to improve the level of disaster mitigation and reduction in sustainable way.

Petal (2008, p. 1) emphasizes that realizing “disaster-resilient communities” is dependent on the success of DRR education. The objective of DRR education is “to convey an understanding of the natural and environmental conditions and the human actions and inaction that lead to disaster, to stimulate changes in individual and group behavior and to motivate advocacy and raise expectations of social policy to reduce these threats” (Petal, 2009, p. 286). One feature of this definition is to refer to the aspects of advocacy and policy which are not observed in the explanation of UNISDR (2005a). One example to support these definitions has been observed when the Great East Japan Earthquake and Tsunami took place in 2011. One of the coastal cities called Kamaishi in Iwate prefecture was seriously affected by tsunami. However, continuous educational efforts sensitized students and as soon as students felt strong sway of earthquake, they by themselves determined to evacuate to higher places. Therefore 2,918 students out of 2,923 survived (Kamaishi City, 2011). This educational practice contained the lecture from community people about the past experiences of tsunami and students were taught the importance of making decisions by themselves without asking to their parents. In addition, the mechanism of earthquake, tsunami and

prognostic phenomenon were taught, hence students had knowledge to natural phenomenon and its potential impact against society, which was essential information for independent decision making.

Shiwaku and Shaw (in printing) studied various examples of DRR education in Japan and pointed out that DRR education could be broadly explained from two aspects, “1) education to nurture the sociality through the components on disaster risk reduction” and “2) education to enhance the capacity of disaster risk reduction”. Sociality means a way to relate to human society in this context. As an example of the first aspect, the Environment and Disaster Mitigation Course installed at Maiko High School, Japan in 2002 aimed to develop human resource, so that through receiving education to enhance skills, capacities and awareness, students can later contribute more to society. The second aspect refers to the education of practical knowledge and skills for DRR. Education at Environment and Disaster Mitigation Course interconnects the learned practical knowledge and skills with their future vision, therefore students can think of the application of their knowledge through their future livelihoods (Nakano et al., in printing).

Thus, DRR education is delivered to raise the public awareness, socialize people, provide knowledge to prepare for and deal with the disaster situation and target to achieve resilient society. However, the role of family and community is not included in the definition of DRR education, although these two are the media of knowledge transfer. Among family members, there is a channel of transferring knowledge between parents, between parents and children, and between seniors and youths (Takeuchi et al., 2011). From community perspective, community can play the significant role in encouraging students to take actual action for DRR (Shaw et al., 2004) and school itself functions as the hub to disseminate DRR knowledge to the community as school children share their learning (Ronan et al., 2008; Shiwaku, 2009). Therefore the integration of family and community is also essential for effective DRR education. Another feature of DRR education is the adoption of different kinds of pedagogy. Education tends to imply school education and public campaign, however, “social media”, “citizen journalism” and “blogging” are also used for knowledge transfer on DRR (Preston, 2012).

Therefore, objectives of DRR education are to raise awareness and deliver knowledge on natural phenomena as well as social impacts, to prepare for disasters and to have knowledge for autonomous decision making. The education is conducted not only in schools and universities, but also in the families and communities through various means, which includes the conversation among family and community members, local knowledge sharing and media.

2.2 Development of DRR education in international context

DRR education is widely recognized for its importance in international society and its critical role in promoting more resilient communities. DRR education was first brought to the attention of the United Nations General Assembly due to declaring the 1990s as “The International Decade for Natural Disaster Reduction (IDNDR)”. At that time the General Assembly called for member states “to take measures, as appropriate, to increase public awareness of damage risk probabilities and of the significance of preparedness, prevention, relief and short-term recovery activities with respect to natural disasters and to

enhance community preparedness through education, training and other means, taking into account the specific role of the news media” (UN, 1989). At the halfway point of the international decade in 1994, World Conference on Natural Disaster Reduction was held in Yokohama, Japan, which became the first world conference adopted the international framework for DRR. During the conference, the progress of IDNDR was reviewed and identified that the education had not sufficiently made progress, hence the framework called “Yokohama Strategy and Plan of Action for a Safer World” recommended considering “the potential role of media, industry, scientific community and the private sector” for DRR education, emphasizing that education plays a role to reduce the vulnerability against natural hazards at community level (UN, 1994, p. 8).

Further development of DRR education in international society was realized through “The United Nations 2000 Disaster Reduction Campaign, Disaster Reduction, Education and Youth”. This campaign aimed to encourage mental changes from disaster response to risk management, promote the incorporation of DRR contents into educational curricula and advocate the youth participation in DRR activities. (UNISDR, 2000). These appeals led to sensitize policy maker and practitioner, hence it resulted in prioritizing education and importance of knowledge in “Hyogo Framework for Action: Building the Resilience of Communities and Nations to Disasters, 2005-2015 (HFA)” which was adopted in the second World Conference on Disaster Reduction held in Kobe, Japan in 2005. The framework consists of five priority actions to call the implementation of DRR for different levels of stakeholders from international to community. Among them, Priority 3 refers to “use knowledge, innovation and education to build a culture of safety and resilience at all levels” (UNISDR, 2005b). The key activities for Priority 3 promote the use of local knowledge, integration of DRR contents into school curriculum, use of informal means of education to disseminate the knowledge to youth and the implementation of training for local volunteer to enhance the capacity of local communities. To accelerate the implementation of Priority 3, UNISDR launched the World Campaign 2006-2007 entitled “Disaster risk reduction begins at school”. This campaign specifically promoted two initiatives, firstly making school buildings safer and secondly mainstreaming DRR in school curricula (UNISDR, 2007). These efforts for promoting DRR education were also built upon the Millennium Development Goals on “Achieving universal primary education” (UNDP, 2015) and the UN Decade of Education for Sustainable Development (2005-2014). Especially, the UN Decade was targeted to develop the concept of “Education for Natural Disaster Preparedness (ENDP)” and its integration to achieve the sustainable development (UNESCO, 2005).

Thus, there has been an evolution of DRR education and Shaw (2014, p. 40-41) summarized its trends as follows,

1. The awareness or perception on the needs of disaster risk reduction has enhanced over years. This is increasingly recognized by the governments, international agencies and other related stakeholders.
2. The need of education goes beyond developing education awareness materials. The recent trend is to link the education part with governance sector, and look at the educational governance in holistic manner.

3. DRRE (DRR education) needs to be customized based on the local needs and context, and therefore, local board of education needs to develop their own system of DRRE based on certain guidance from the national authorities.

School structural safety from any kind of natural hazards is also an important topic in the context of DRR in education, as priority 3 of HFA refers to the physical safety of schools. The International Conference on School Safety was held at Ahmedabad, Gujarat, India in 2007 and Ahmedabad Action Agenda for School Safety was adopted. The action agenda set up the goal of “Zero Mortality of Children in Schools from Preventable Disaster by the year 2015” (Ahmedabad Action Agenda for School Safety, 2007). The agenda indicated the series of actions from viewpoints of both immediate priority and long term accomplishment by 2015, with the perspective of following three aspects, i) disaster risk reduction education in schools, ii) disaster resistant school infrastructure and iii) safe school and community environments. In order to discuss the region-specific approach for school safety in the Asia-Pacific region, the Asia Pacific Regional Workshop on School Education and Disaster Risk Reduction held and adopted the Bangkok Action Agenda (2007). The following priority areas of action were stated in the agenda; i) Integrating Disaster Risk Reduction into School Education, ii) Strengthening Disaster Risk Reduction Education for Community Resilience, iii) Making Schools Safer, iv) Empowering Children for Disaster Risk Reduction.

Even though safe school environment had been highlighted in international society, actual practice was fallen behind. Due to the 2005 Kashmir earthquake, 17,000 school children lost their lives because of the collapses of school buildings (AKPBS, 2008). Besides, Sichuan earthquake in 2008 killed more than 5,000 students due to the collapse of poorly constructed school building (The Guardian, 2009). Not to repeat these tragedies, the International Conference on School Safety was held at Islamabad in 2008 and declared the Islamabad Declaration on School Safety. The declaration stated that needs of policy, guidelines and implementing and monitoring mechanism to ensure the actions of “identifying resilient school needs, retrofitting existing structures, creating evacuation plans and safe havens, improving community and student awareness through outreach and simulations. Selection of safe sites, design and construction technologies and materials also apply to the larger built environment” (Islamabad Declaration on School Safety, 2008).

Third World Conference on Disaster Risk Reduction was held in Sendai, Japan. “Sendai Framework for Disaster Risk Reduction (SFDRR)” becomes a new agenda for 2015-2030 after HFA and the framework declared to pursue the goal that “Prevent new and reduce existing disaster risk through the implementation of integrated and inclusive economic, structural, legal, social, health, cultural, educational, environmental, technological, political and institutional measures, prevent and reduce hazard exposure and vulnerability to disaster, increase preparedness for response and recovery, and thus strengthen resilience” (UNISDR, 2015, p. 12). The framework set up four priorities for action;

Priority 1: Understanding disaster risk

Priority 2: Strengthening disaster risk governance to manage disaster risk

Priority 3: Investing in disaster risk reduction for resilience

Table 2.1 Comparative analysis of HFA and SFDRR in education

Contents of the Framework	HFA	SFDRR
Objectives	Sharing good practices and lessons, increasing awareness of the importance disaster reduction policies and increasing the reliability and availability of appropriate disaster-related information are related to education issue.	Objectives does not mention.
Expected outcome	There is no direct description on education.	There is no direct description on education.
Strategic goals (Goal)	Enhancing capacities is focused.	Necessity of educational measures is mentioned.
Priority 1	Capacity development of human resources is mentioned.	The following education issues are focused. <ul style="list-style-type: none"> • Promoting investments in innovation and technology development for educational challenges • Formal and non-formal education, civic education and professional education and training • Promoting national strategies to strengthen public education and awareness • Developing effective global and regional campaigns as instruments for public awareness and education
Priority 2	Training and technical capacity building for risk assessment, monitoring and early warning is mentioned.	Education issues are not mentioned clearly but importance of public awareness-raising and training initiatives in national and local framework is focused.
Priority 3	Priority 3 is directly related to education. Information management and exchange, education and training, and public awareness are suggested as the main focuses related to education. These three focuses covers 14 key activities out of 16.	It is emphasized to strengthen the design and implementation of inclusive policies and social safety-net mechanisms through integration with education
Priority 4	Sharing of expertise, knowledge and lessons learned in recovery and rehabilitation processes is emphasized.	Promoting the resilience of educational facilities is mentioned.
Priority 5	Knowledge and capacities are emphasized to reduce impacts and losses.	-

(Shiwaku and Shaw, in printing)

Priority 4: Enhancing disaster preparedness for effective response and to “Build Back Better” in recovery, rehabilitation and reconstruction

In the educational context, it promotes all stakeholders for further investment, sharing of practices, integration of DRR into formal and non-formal education and ensuring the safety of school building. The framework also indicates the importance of training and educational curricula for children, and youth is recognized as one of the stakeholders who can play a role in DRR, who used to be considered as the object of being given the protection (Chatterjee et al., 2015). Shiwaku and Shaw (2015) had conducted the comparative analysis between the HFA and SFDRR in educational context. The analysis pointed out that the objective of HFA contains education related aspects, while the objective of SFDRR doesn't mention education as Table 2.1 indicates. In the priorities, HFA sets up independent priority focusing on the education, however educational issues in SFDRR are incorporated into all priorities. This suggests that education is recognized as the cross-cutting issues (Shiwaku and Shaw, in printing). It implies that better implementation of DRR education requires the involvement of various stakeholders as well as the different modes of education.

Thus, international frameworks and campaigns have been putting emphasis on the needs of educational approach to achieve the resilient community and they have been calling for the incorporation of different kinds of stakeholders besides the integration of DRR into formal education and the use of informal means of education. Awareness to DRR was raised in governments and international agencies, thus DRR education started to be considered as the educational governance issues rather than individual DRR contents.

2.3 Formal, non-formal and informal education

The term of formal, non-formal and informal education are commonly used in both educational literature as well as the study of DRR education (Coomb and Ahmed, 1974; La Belle, 1982; Dib 1988; ISCED, 2011; Shaw et al 2011; Fernandez, 2012; Oikawa, 2015). In this section, the definition of three modes of education are reviewed to build a basis of discussing their implications for DRR education. The summary of the discussion is introduced at Table 2.2 and it should be noted that definition of educational modes may show slight variations based on the country and cultural contexts.

2.3.1 Definition of formal education

Coombs and Ahmed (1974, p. 8) distinguished modes of education into three based on educational methods and sources. Formal education was defined as a “highly institutionalized, chronologically graded and hierarchically structured ‘education system’, spanning lower primary school and the upper reaches of the university”. Dib (1988) also pointed out that the formal education is implemented in an organized and structural way through curriculum at school and university. In the framework of formal education, students promote to the next grade, therefore the system of assessment is required in addition to curriculum and involvement of teachers. Since it is conducted at school, the education adopts a top-down methodology in

Table 2.2 Summary of definitions of three modes of education

Author	Formal education	Non-formal education	Informal education
Coombs and Ahmed, 1974	<p><Structure></p> <ul style="list-style-type: none"> ● Institutionalized, chronologically graded and hierarchically structured "education system" ● Spanning lower primary school and the upper reaches of the university 	<p><Location></p> <ul style="list-style-type: none"> ● Outside of the formal system <p><Structure></p> <ul style="list-style-type: none"> ● Organized, systematic, educational activity ● Provide selected types of learning to particular subgroups in the population, adults as well as children 	<p><Structure></p> <ul style="list-style-type: none"> ● Unintentional learning ● Learning through daily life and exposure to the environment
Dib, 1988	<p><Location></p> <ul style="list-style-type: none"> ● School and university <p><Structure></p> <ul style="list-style-type: none"> ● A systematic, organized education model, structured ● Delivered through curriculum ● Mostly mono-directional 	<p><Location></p> <ul style="list-style-type: none"> ● Outside of educational institution <p><Structure></p> <ul style="list-style-type: none"> ● Curriculum and methodology adopted based on the needs and interests of students ● Timeframe varies depends on learners work pace 	<p><Structure></p> <ul style="list-style-type: none"> ● Not organized and not systematic ● Not lead to the acquisition of degree or diploma ● Supplement for formal and non-formal education
Tissot and Cedefop, 2004	<p><Structure></p> <ul style="list-style-type: none"> ● An organised and structured ● Learning is intentional from the learner's point of view ● Leads to validation and certification 	<p><Structure></p> <ul style="list-style-type: none"> ● Embedded in planned activities not explicitly designated as learning ● Intentional from the learner's point of view 	<p><Structure></p> <ul style="list-style-type: none"> ● Learning in daily activities ● Not organised or structured in terms of objectives, time or learning support ● Unintentional from the learner's perspective
ISCED 2011	<p><Structure></p> <ul style="list-style-type: none"> ● Institutionalised, intentional and planned and constitute the formal education system of a country ● Delivered through national level authorities in education ● Includes vocational, special needs and some adult education if recognized by national education authorities 	<p><Structure></p> <ul style="list-style-type: none"> ● Institutionalised, intentional and planned by an education provider ● complement to formal education ● Leads to qualifications that are not recognized as formal qualifications 	<p><Structure></p> <ul style="list-style-type: none"> ● Non-organized and non-structured ● Unintentional learning

the most of the cases. The Office for Official Publications of the European Communities (Cedefop) also proposes the definition of three different modes of education. In addition to the definition earlier mentioned, formal education is an intentional learning and it results to awarding certificate or diploma (Tissot and Cedefop, 2004). International Standard Classification of Education (ISCED), which makes a standard for terminology in education, published the latest revision of definition in 2011. This classification explains that formal education is “institutionalised, intentional and planned through public organizations and recognised private bodies, and – in their totality – constitute the formal education system of a country” (ISCED, 2011, p. 11). Thus the formal education is delivered through national level authorities in education. ISCED (2011) includes vocational education, special needs education and adult education as formal education when qualification recognized by national education authorities is awarded to learners.

In summary, formal education is delivered through curriculum in the school framework based on institutionalized education system of educational authority and it adopts the promotion system which leads to the validation and certification.

2.3.2 Definition of non-formal education

While formal education takes place under institutionalized national education system, non-formal education is “any organized, systematic, educational activity carried on outside the framework of the formal system to provide selected types of learning to particular subgroups in the population, adults as well as children” (Coombs and Ahmed, 1974, p. 8). Dib (1988) distinguished non-formal education from formal education by adopted strategies. Non-formal education is held outside of educational institution, and curriculum and methodology are adopted based on the needs and interests of students. Timeframe is not necessarily pre-established unlike formal education and it flexibly changes depends on work speed of learners. Tissot and Cedefop (2004) also has similar viewpoint to previously mentioned definition. It is defined as “learning which is embedded in planned activities not explicitly designated as learning (in terms of learning objectives, learning time or learning support). Non-formal learning is intentional from the learner’s point of view” (Tissot and Cedefop, 2004, p. 133). ISCED (2011, p. 11) explains that non-formal education is also “institutionalised, intentional and planned by an education provider” and this form of education functions as a complement to formal education within the process of lifelong learning of individuals. Another feature pointed out by ISCED (2011, p. 11) is that “Non-formal education mostly leads to qualifications that are not recognised as formal or equivalent to formal qualifications by the relevant national or sub-national education authorities or to no qualifications at all”.

Hence, non-formal education is delivered in a structured and organized way as is formal education, however, it is conducted outside of educational institution and adopts the curriculum and methodology based on the learners’ interest, and the object of education may differ, depending on the type of learning.

2.3.3 Definition of informal education

While both formal and non-formal education are carried out in organized and planned way and hence the

learnings are intentional, Coombs and Ahmed (1974, p. 8) indicates that informal education is unintentional learnings through the experience of daily life such as “exposure to the environment -at home, at work, at play; from the example and attitudes of family and friends; from travel, reading newspapers and books; or by listening to the radio or viewing films or television”. Dib (1988) pointed out that informal education is diversified compared with formal and non-formal education. The knowledge is not transferred in organized and systematic way, hence it does not necessarily have the objectives and subjects as other educational modes, and it does not lead to the acquisition of degree or diploma. This definition regards informal education as a supplement for formal and non-formal education and following activities are considered as informal education; “(a) visits to museums or to scientific and other fairs and exhibits, etc.; (b) listening to radio broadcasting or watching TV programmes on educational or scientific themes; (c) reading texts on sciences, education, technology, etc. in journals and magazines; (d) participating in scientific contests, etc.; (e) attending lectures and conferences” (Dib, 1988, p. 305). Tissot and Cedefop (2004, p. 93) defines education as “Learning resulting from daily activities related to work, family or leisure. It is not organised or structured in terms of objectives, time or learning support. Informal learning is in most cases unintentional from the learner’s perspective.” The ISCED incorporated a new definition of informal education in 2011 which differs from the previous version published in 1997. The definition focuses the non-organized and non-structured features and explains it as unintentional learning “in the family, workplace, local community and daily life, on a self-directed, family-directed or socially-directed basis” (ISCED, 2011, p. 12).

Therefore, informal education is summarized as a non-organized and non-structured mode of knowledge transfer but unintentional for learners. This mode may include visits to museums, listening to radio broadcasting or watching TV programs, reading texts, journals and magazines, participating in contests, attending lectures and conferences, as well as conversation in the family, experiences in workplace, local community and daily life.

2.4 DRR in formal, non-formal and informal education

DRR education uses different modes of knowledge transfer as mentioned in the section 2.1. School education and public awareness programs are the major activities widely conducted in the world, on the other hand, local knowledge and media which share the DRR related knowledge in community also fall in the scope of DRR education. Thus, this section provides the ranges of DRR education under the category of three modes; formal, non-formal and informal education.

2.4.1 DRR in formal education

Institutionalized education system of national educational authority delivers the formal education in the framework of school. Within the area of formal education, “policy and institutional frameworks”, “curriculum”, “role of teachers in disaster response”, and “school buildings and safety” are raised as related themes of DRR education (Smawfield, 2012).

Educational authority provides unified curriculum, hence the incorporation of DRR contents into curriculum is one of the effective means of DRR education in formal education. There are four approaches

to integrate DRR education into curriculum, i) curriculum integration, ii) extra-curriculum integration, iii) curriculum infusion, and iv) stand-alone course (Petal, 2008). For example, as one of the example of curriculum integration, the educational curriculum in Nepal includes the landslides, soil erosion, volcanoes and human consequences of natural disasters in the grade five of science class, and social studies classes in grade nine cover the role of local agencies in disasters, earthquake, careless use of electricity and so on (UNICEF, 2012). In Taiwan, after Chi-chi earthquake in 1999, government developed nine year DRR education guideline with the support of local university. The guideline included the explanation of common disasters depending on the grades of student and came with workbook. This movement aimed to integrate DRR education into curriculum (Gwee, 2011). Apart from the curriculum, co-curricular activities with DRR related contents are also conducted as school-based activities (Khan and Iqbal, 2014). Evacuation drill in Japan is an example of co-curricular activities because the drill is not prescribed as a part of curriculum, however it is obliged to conduct it at every school under fire service act, therefore schools allot time for evacuation drill as a part of co-curricular activities.

In terms of teacher, the quality of education is highly influenced by the teacher's capacity. Implementation of DRR training is also one of the role of formal education authority. Thi (2014) suggested that teachers' training makes teachers active and take leadership in DRR activities, hence the training is an entry point to implement DRR education at schools. In addition, teacher can play a role not only to provide DRR education, but also to bring DRR into school management. In addition, Smawfield (2012) pointed out that teachers can act effectively in response and long-term recovery after disaster such as logistics and coordination because teachers are regarded as knowledgeable in a particular community and considered to be able to give a guidance and take a leadership in emergency. One example of teachers' practices in DRR education was observed in Kesennuma city, Miyagi prefecture, which city was severely affected by earthquake and tsunami in 2011. Some teachers in Kesennuma city formed teacher's research group and developed "Disaster Education Sheet" (Oikawa, 2015). The sheet was developed with the aim of incorporating DRR related contents into planning of school lessons. The sheet consists of 71 series of sheets and each sheet explains DRR related activities of variable activity lengths. Therefore, teachers can utilize the sheet to implement DRR education in accordance with the available time of class at school.

Ensuring the school structural safety as well should be highly concerned because students spend significant time of a day in schools. Hence it is critical that school structure is resilient enough to the natural hazards (Schilderman, 1990; OECD, 2004; INEE, 2009; FEMA, 2010; Institute of Structural Engineers, 2010). Due to the Nepal Gorkha earthquake, total 19,653 classrooms were fully damaged (Education Cluster, 2015) and it revealed the vulnerability of school structure. Since the SFDRR establishes goal to "Substantially reduce disaster damage to critical infrastructure and disruption of basic services, among them health and educational facilities, including through developing their resilience by 2030" (UNISDR, 2015, p. 12), structural safety of school buildings should be prioritized, which is for the responsibility of educational authorities.

2.4.2 DRR in non-formal education

Non-formal education takes structured and organized form in transferring knowledge as formal education does, however it occurs out of the framework of educational institution and adopts various kinds of curriculum and methodology based on the learner's interest. Smawfield (2012) explains that non-formal DRR education is mainly conducted by non-governmental organizations (NGOs) and they play roles of "transmitting appropriate educational and developmental messages; changing attitudes, knowledge and behaviors; helping to develop livelihood skills; and sensitizing the disempowered to their civil, legal and human rights" (Smawfield, 2012, p. 12), which all viewpoints can be interlinked with natural hazards and DRR. Even though this explanation considers main stakeholders as NGOs, it does not have to limit to them. In fact, governmental organizations, which are not normally considered a formal education sector implement a DRR education program as indicated by Shah (2008). For example, Ministry of Disaster Management and Relief in Bangladesh carries out the government initiated public awareness and training programs which specifically target for community. The training is given to local community members, school teachers, and women and children, and information communicated with local communities includes disaster risks, community needs, available government assistance programs, seasonal preparedness knowledge, and post-disaster tips (Biswas and Reza, 2000). These types of public educational programs conducted by NGOs and governmental organizations are diversified in terms of contents depending on the target group and natural hazards. Hazard identification through town watching, disaster preparedness planning at community and family level, evacuation planning, promotion of disaster resilient construction, clean-up of flood channels, evacuation drills, psychological and physical first aid training are some examples (Shiwaku and Fernandez, 2011; IFRC, 2011).

As different types of programs are conducted, the providers are also diversified. One example is the disaster prevention and welfare community (Known in Japanese as BOKOMI, shortened from Bosai Fukushi Community) which are community based voluntary organization installed at every elementary school district in Kobe city, Japan. After Great Hanshin-Awaji earthquake hit Kobe in 1995, the importance of community based disaster management was highly recognized and this initiative was started by Kobe city government. Kobe fire bureau takes roles of giving awareness and disaster risk management related training, and some BOKOMI involve the police department and NGOs for implementing drill, thus participation of different governmental and NGOs works together to carry out DRR programs in non-formal education context.

2.4.3 DRR in informal education

Informal DRR education covers different means of knowledge transfer. There are many kinds of tools for informal DRR education, as Table 2.3 indicates. Written materials such as posters and toys, audio-visual materials such as video, cultural and performing arts such as music, dance and artworks, competitions such as voluntary drawing competitions, and parents and local community involvement such as exhibition and displays of risk maps and artworks are examples (Petal, 2008).

Table 2.3 Means and tools used in informal education

Tools	Contents of tools
Dissemination of written materials	● Use of posters and signage
Creative educational materials	● Toys, games, documentary and short videos, storybooks, comic books, puzzles, and computer games
Cultural and performing arts (Bhattia, 2006, in Petal, 2008)	● Music, song, poetry, dance, puppetry, magic, street theater, improvisation, pantomime and artworks
Competitions, awards and commendations	● Voluntary drawing and writing competitions ● “Disaster Risk Reduction Knowledge Tournaments” on radio or television broadcast
Parents and local community involvement	● Exhibitions and displays of student-created risk and capacity maps, models, artwork and essays
Transfer of local Knowledge	● Transmitted knowledge over generation in the form of song, storytelling, saying, local technology
Media	● Preparedness information, early warning, damage situation and lifeline information and long-term recovery information ● Broadcasting earthquake experiences based on the past experiences
Conversation	● Between the parents ● Between parents and children ● Between the senior members and the younger generations

Adopted from Petal, M. (2008), added by author

Since the definition of the informal education includes the learning in local community and UNISDR definition of DRR education promotes the use of local knowledge, local knowledge is also regarded as the strong tool for informal education. It is inherited from generations to generations in various forms such as song, storytelling, saying and local technology and they are observed in specific location related with living environment. One typical example is seen in a village near volcano Mayon in Luzon Island, Philippines where 47 times of eruption was recorded in past 400 years (Cerdena, 2008). People in the village called Matanag observe prognostic phenomena of the tremor, domestic animals’ reaction etc. and utilize those information for evacuation before the eruption. The local knowledge sometimes is not scientifically examined, however it is transmitted over generations in the community and it is time tested in the local context (Sharma, 2008).

Existing media such as mass media and newly emerged media such as social media disseminate the disaster related information. Media disseminate necessary information in pre-, during and post- disasters, for instance, preparedness information, early warning, damage situation and lifeline information, and

long-term support for the recovery of the society (Ilieva, 2015). Community radios also function as the tool because the localized information is required in every disaster phase of “damage mitigation, preparedness, early-warning, response and recovery and rehabilitation” (Shaw, 2012, p. 2). Now the role of community radio is expanded to provide the knowledge of disaster risk reduction as a radio station established after Great Hanshin-Awaji earthquake. It continues to broadcast the knowledge and wisdom of those who experienced the great disaster (Hibino, 2014).

Social media can share the information faster than other kinds of media. According to the Oxford dictionary, the term social media is defined as “websites and applications that enable users to create and share content or to participate in social networking” (Oxford, 2015). Facebook and Twitter are well-known social media and White (2014) pointed out the benefit of social media in disaster context is that information reaches broader audience by sharing and retweeting information and the information is delivered immediately. When the information reaches to individuals, ripple effect to other family members and community is expected through conversation which is also a part of informal education. As explained, informal education adopts various means of information transfer and its pattern depends on the community and family composition. Besides, approaches and tools of information transfers are localized hence informal education should be understood differently from place to place.

2.5 Concept of institutionalization of DRR education

The definition of formal, non-formal and informal education as reviewed above show that different forms of DRR education corresponds to one of three modes of education. In order to enhance the effectiveness of DRR education, educational literature as well as DRR education study indicate the needs to pursue the synergetic effect among three educational modes. Educational literatures pointed out that non-formal education is conducted to supplement the formal education (La Balle, 1981; ISCED, 2011), integration of informal education into formal education enhance educational effectiveness (Hofstein and Rosenfeld, 1996) and education is needed in the direction of combining formal one which are specific to class, with non-formal and informal strategy (Tudor, 2013). From the viewpoint of DRR education, international organization and agenda promote the use of informal education at formal education (UNISDR, 2005; UNISDR, 2009). Shaw et al. (2011) pointed out that effectiveness of DRR education has to be enhanced through the coordination of three types of education. Realizing the synergetic implementation of three modes of DRR education, new concept for DRR educational institution which comprehends three modes is required, therefore institutionalization of DRR education needs to be proposed.

Before explaining the direction of institutionalization, definition of institution is needed to be understood. Although the definition does not have complete common understanding, Greenwood et al., (2008, p. 522) explains as “shared rules and typifications that identify categories of social actors and their appropriate activities or relationships”. Thus, institution basically means the rules that society shares and actors follows, and it can be divided into two forms of formal rules such as laws, regulations and legal orders and informal rules such as conventions, norms and values (Leftwich, 2006). The term institutionalization is, if simply understood, the process of becoming an institution. Wiseman (2007, p. 1113) defines that

“Institutionalization is the process through which the learning that has occurred by individuals and groups is embedded in the design of the systems, structures, and procedures of the organization. It is through institutionalization that individual and group learning is leveraged and capitalized on in an organization”. Institutionalization is thus a process that individual learning turns into a patterned behaviors of group and it fixes as the system, structure and procedures and results in enhancing the effectiveness. One example of institutionalization was observed at Saijo city, Ehime prefecture, Japan. Board of Education of Saijo city has started DRR education program called “12 year-old education” in 2006 with the strong initiative of former mayor. The program targeted all the students of class six (12 year- old) and has been conducted in summer vacation with full of participation of students as well as community people. Matsuura (2015) described that students and community were encouraged to participate in because it was city-wide effort. In addition, the program adopted participatory approach of community such as building the partnership between schools and communities to share problem and vision for community building, thus it led to nurture the sense of belonging and attachment to the community. Even though the program has been started with the initiative of government, repeated practices with community participation helped to be embedded as an annual activity.

Therefore, although three modes of education which are individually and independently conducted under the present situation, through proposing the new framework of implementing them coordinately and applying new framework in implementing DRR education, the pattern of implementation can be embedded in the system, structure and procedures. Therefore institutionalization of DRR education is achieved. This embedding can be the formal institution such as laws, regulations and legal orders as well as informal institution such as conventions, norms and values. Hence this study aims to propose the new institutional framework of DRR education from perspective of three modes of education.

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Chapter 3 Profile of state of Uttarakhand

In this chapter, the background of Uttarakhand is reviewed and the legal and institutional framework in disaster risk management (DRM) and education is summarized, which forms a foundation of discussion in proposing the new framework of institutionalized DRR education.

3.1 Outline of Uttarakhand

3.1.1 Geographical and administrative overview of Uttarakhand

The state of Uttarakhand is located in the north-west of India which is in the middle range of the Himalayan Mountains, and shares northern border with Tibet, eastern border with Nepal, southern border with Uttar Pradesh and western border with Himachal Pradesh. The state was established in 2000 as 27th state of India separating from the state of Uttar Pradesh.

The state is administratively divided into two divisions, Garhwal and Kumaun, and 13 districts. Garhwal division has seven districts, Pauri Garhwal, Tehri Garhwal, Chamoli, Haridwar, Dehradun, Uttarkashi and Rudraprayag. Kumaun division has six districts, Almora, Bageshwar, Champawat, Nainital, Udham Singh Nagar and Pithoragarh (Administrative map is shown in Chapter 1). Dehradun is the capital of Uttarakhand. There are different layers of administrative body in India depending on urban and rural area as Figure 3.1 shows.

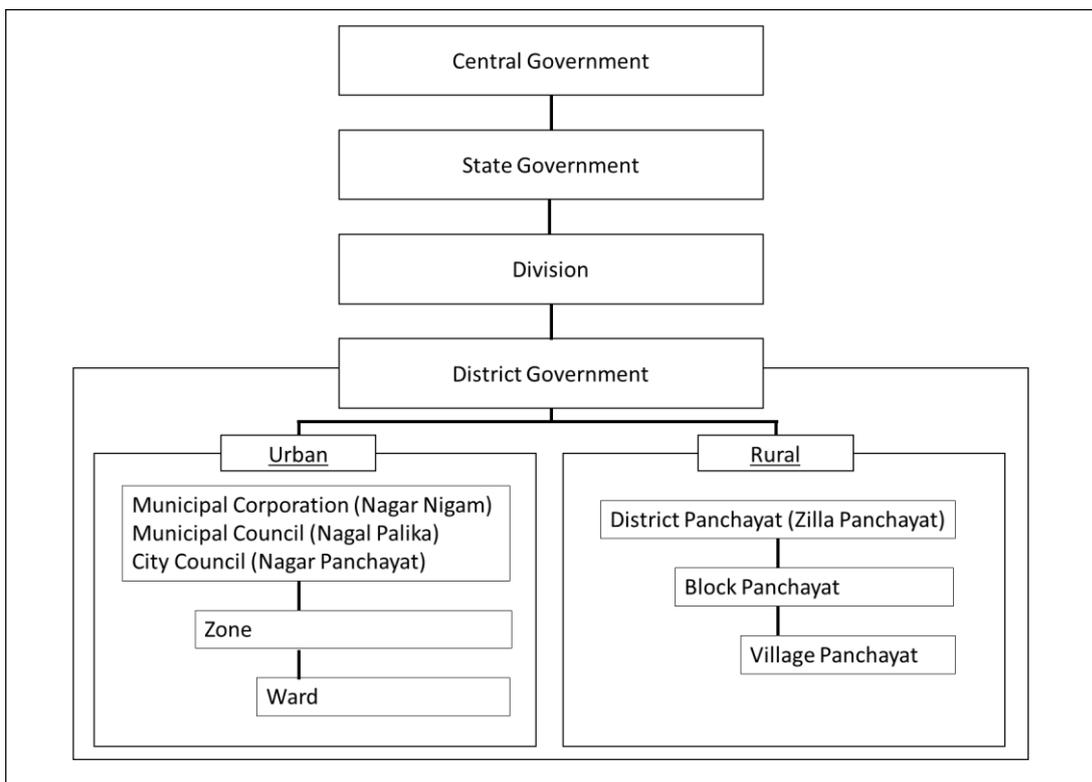


Figure 3.1 Administrative set-up in India

It starts from the national administrative body and goes down to divisional level. The districts are managed under different administrative body depending on urban and rural area. In urban area, city is graded as

Municipal Corporation (Nagar Nigam), Municipal Council (Nagar Palika) and City Council (Nagar Panchayat) based on the population. In Uttarakhand, there are three Municipal Corporations including Dehradun Municipal Corporation, 32 Municipal Councils and 30 Nagar Panchayats. Under those bodies, there are the smallest units of administration which are wards. In rural area, smallest unit of administrative body is Village Panchayat and there are 16,826 villages in the state (DMMC, 2014a). Village Panchayat is headed by an elected person from local community and the head is called Gram Pradhan. Panchayat is a traditional self-government organization in rural area and it is divided into three layers, District Panchayat, Block Panchayat and Village Panchayat. Even though there are different layers of administrative bodies under district level, disaster management is responsible for the district level administration. For instance, Dehradun Municipal Corporation has been given a certain level of authority in administration, hence the municipal corporation constructs the road and improves water supply and sewerage. However, since the corporation is geographically located within the Dehradun district, the disaster management is under district administration.

The state has geographical area of 53,483 km² and 86.07% of the total area (46,035 km²) is categorized as hilly area (DMMC, 2011). The lowest altitude starts approximately from 200m in the south and it goes up to 8,000m above mean sea level. In fact, approximately 28% of the territory is above 3,000m hence the state has steep geographical feature (DMMC, 2011). Apart from administrative division, the state is geographically divided as follows (Trivedi, 2014),

1. Upper hills— Uttarkashi, Chamoli, Rudraprayag, Pithoragarh and Bageshwar
2. Middle hills — Tehri-Garhwal, Garhwal, Almora, and Champawat, the hill regions of Nainital and Chakrata tehsil of Dehradun
3. Foothills —The remaining area of Dehradun, Haridwar, Udham Singh Nagar and the remaining area of Nainital

3.1.2 Demographic and socio-economic situations

3.1.2.1 Context of state of Uttarakhand

According to the Census of India (GoI, 2011), Uttarakhand has population of 10,086,292 and faces the rapid population growth of 18.81% in decadal rate between 2001 and 2011, which is slightly higher than the national average of 17.64 %. Population density is 189 people per km² and it is approximately a half of the national average of 382 per km². This low population density is because of the limited habitual environment as 61.91% of the land is covered by forest and 13.73% of the area is glacial land (DMMC, 2014a). Even though the population density is not high, the state has the major pilgrimage circuit of India. Pilgrims from different religions visit the holy places. Hence there are significant number of floating population especially in pilgrimage season. In terms of the population distribution, approximately 7.37 million live in rural area while 3.05 million live in urban area. It is defined that urban area is municipality, corporation or cantonment or notified town area, or satisfies the criteria of one of followings; i) areas of minimum population of 5,000, ii) at least 75 % of the male working population is non-agricultural or iii) density of population of at least 400 per km² (MHA, undated).

Literacy rate in the state is 78.82% and in gender perspective, male's literacy rate is 87.40 % and female is 70.01% (GoI, 2011). There is a gap around 17% between male and female, thus as other developing country, the education for women is one of the developmental issues.

In terms of the industry, people in Uttarakhand depends their livelihood on mixed practice of farming, forestry, horticulture and livestock rearing. Even though the area is covered mostly by mountains, agricultural land occupies 21.72% of total land cover and produces mostly cereals. Agriculture in the state contributes 22.41% of domestic product and 75-85% of the population depends on the agriculture for livelihood (DMMC, 2014a). Tourism industry is also growing sector, since facilities for tourist such as hotels and transportation are required. In 2012, 27 million people have visited Uttarakhand state as tourist (Tourism Fest, 2013).

3.1.2.2 Urban-rural context

Since the study contains the comparison between two districts, district Dehradun as urban context and district Rudraprayag as rural context, demographical and socio-economic situation of these two districts are introduced. Figure 3.2 shows the overviews of commercial zones of both Dehradun and Rudraprayag, and statistical data is shown in Table 3.1. Dehradun, the capital of the state, has 1.7 million of population which is the biggest district in Uttarakhand. Dehradun district is composed of the area administrated under municipal corporation as well as villages and 8.81% of the land falls in the category of urban area with 55.52% of total population. Thus, most of the land is not categorized as urban area. However, population density of Dehradun district is 549 persons per km², which is higher than 400 persons per km² of urban criteria. In addition, as mentioned earlier, the disaster management is a matter of district level administration. Therefore, this study analyzes the Dehradun as urban context. Rudraprayag district has 242,285 of population and all the administrative unit is categorized as village. The district has limited urban area of 0.64%, and only 4.10% of district total population live there. Therefore, most of the people resides in rural area.



Figure 3.2 Commercial zone of Dehradun (left) and Rudraprayag (right)

As other urbanizing cities, Dehradun also keeps high rate of population growth. It grows 32.33% in the decade between 2001 and 2011 while Rudraprayag increases only 6.53% which is much less than the state average rate of 18.81%. The other feature in the comparison between Dehradun and Rudraprayag are the sex ratio. Dehradun district has 902 females per 1,000 males and Rudraprayag has 1,114 females per 1,000 males. This tendency takes place because males are more likely to migrate to urban area for job opportunities leaving their family behind in the rural area.

Table 3.1 Demographic comparison of two districts, Dehradun and Rudraprayag

	Uttarakhand	Dehradun	Rudraprayag
Population (persons)	10,086,292	1,696,694	242,285
Urban population	30.23%	55.52%	4.10%
Total area	53,483km ²	3,088km ²	1,984km ²
Urban area		8.81%	0.64%
Population density (persons per km ²)	189	549	122
Decadal population growth 2001-2011	18.81%	32.33%	6.53%
Sex Ratio (Number of females per 1000 males)	963	902	1114

Socio-economic status of the state average and comparison between Dehradun and Rudraprayag is shown in Table 3.2. Literacy rate in Dehradun is 84.25% and Rudraprayag is 81.30% thus both rate is higher than the average of the state (GoI, 2011). Even the state average is higher than the national average of 74.04%. This may be because the number of highly reputed educational institutes are operated in the state (DMMC, 2014a).

Table 3.2 Social condition of Uttarakhand state, and Dehradun and Rudraprayag districts

	Uttarakhand	Dehradun	Rudraprayag
Literacy rate in total	78.82%	84.25%	81.30%
Male's literacy rate	87.40%	89.40%	93.90%
Female's literacy rate	70.01%	78.54%	70.35%
Accessibility to tap water from treated source	53.9%	77.15%	64.17%
Inaccessibility to latrine (No latrine within premises)	34.2%	13.55%	47.15%

From the sanitation and hygiene point of view, Census of India 2011 indicates that those who have access to treated tap water is 77.15% and 64.15% in Dehradun and Rudraprayag respectively. Rudraprayag is a hilly and rural area, however, access to the tap water has been improved due to the tourism development such as improvement in road connectivity, electrification, water and construction of hotels (Figure 3.3). In

fact, Rudraprayag has major pilgrims' destination known as Kedarnath. However, big gap between two districts is observed at inaccessibility to latrine within the premises. While 13.55% of people does not have the access to latrine in Dehradun, in Rudraprayag 47.15% of people has no access to latrine.



Figure 3.3 Hotel construction for tourism (left) and improved road connectivity (right)

The features in category of workers also differentiate urban and rural context. The Census of India (GoI, 2011) shows four categories of workers; cultivators, agricultural laborers, workers in household industry and other workers. As Table 3.3 indicates, approximately 20% of people in Dehradun district engages in agriculture related occupation (13.24% of cultivators and 6.55% of agricultural laborers), 73.57% of people works as cultivators in Rudraprayag. Cultivators are those who possess their own land to cultivate, and agricultural laborers are those who work as hired labor under agricultural industry. Workers in household industry are the category of small industry that family owns, for instance, small grocery shop. 76.26% of Dehradun district works as employee of private company as well as government related works, while 21.37% of Rudraprayag district do same kinds of work. Therefore, it is completely opposite features that around 75% of people in Rudraprayag engages in agriculture, while 76.26% of Dehradun population works for private company and government.

Table 3.3 Category of workers

	Uttarakhand	Dehradun	Rudraprayag
Cultivators	40.81%	13.24%	73.57%
Agricultural laborers	10.42%	6.55%	2.83%
Workers in household industry	2.95%	3.95%	1.87%
Other workers	45.82%	76.26%	21.37%

Differences of population density, decadal growth rate of population, types of work and inaccessibility to latrine are all factors that distinguish urban and rural area. Even though Rudraprayag has high accessibility to tap water, this is encouraged due to tourism development. Therefore, this study regards Dehradun district as urban area and Rudraprayag as rural area.

3.1.3 Natural disasters in Uttarakhand

3.1.3.1 Geophysical disasters

The collision of Indian and Eurasian plates produces the Himalayan mountains, thus the area is tectonically sensitive and historically affected by seismic disasters such as Kumaun Earthquake of 1720, Garhwal Earthquake of 1803, Shillong Earthquake of 1897, Kangara Earthquake of 1905, Bihar – Nepal Earthquake of 1934 and Eastern Assam (Arunachal) Earthquake of 1950. In fact, since 1803, 36 earthquakes with greater than magnitude 5.0 on Richter scale took place between 1803 and 1999 and 12 earthquakes with greater than magnitude 6.0 occurred only in 20th century (Babu, 2003). Seismic Zoning Map, shown in Figure 3.4, classified south and south-western part of the state as Zone IV and north and north-east part of the state as Zone V. Under the classification, Zone IV is explained as severe intensity zone which has potential intensity of VIII in Modified Mercalli scale and Zone V as IX under Modified Mercalli scale. For the reference, VIII in Modified Mercalli indicates “Damage slight in specially designed structures; considerable damage in ordinary substantial buildings with partial collapse. Damage great in poorly built structures. Fall of chimneys, factory stacks, columns, monuments, walls. Heavy furniture overturned.” And IX is “Damage considerable in specially designed structures; well-designed frame structures thrown out of plumb. Damage great in substantial buildings, with partial collapse. Buildings shifted off foundations” (USGS, 2013).

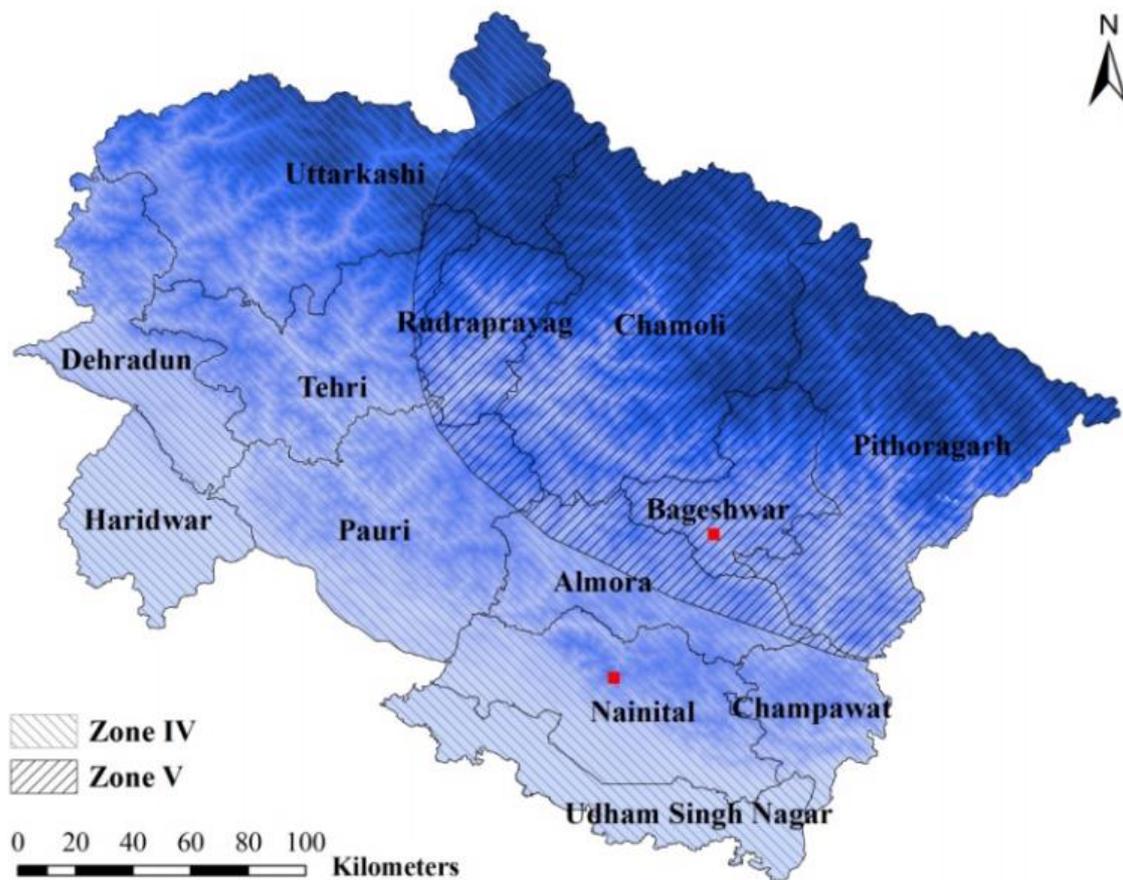


Figure 3.4 Seismic Zoning Map of State of Uttarakhand

Most recent and significant seismic activities are known as Uttarkashi earthquake occurred in 1991 and Chamoli earthquake in 1999 as Table 3.4 and Figure 3.5. The Uttarkashi earthquake took place with the scale of magnitude 6.6 at 2:53AM on October 20th. Hence people were all sleeping deeply, and collapses of houses caused loss of human lives as Table 3.4 shows. Infrastructures such as roads and bridges were seriously damaged, and it caused difficulties in rescue and relief activities. Due to the earthquake, Uttarkashi, Tehri, Rudraprayag and Chamoli districts were affected. 1999 Chamoli earthquake occurred at 12:35am on March 29th with magnitude 6.8 on Richter scale. The earthquake destroyed approximately 90% of houses in Chamoli district and most of them were non-engineered structure while ancient structures stood for the earthquake (Babu, 2003). This earthquake brought damages to school buildings as well, since the slate or galvanized corrugated iron (GCI) were used for the roof and they did not tie the walls with roof, which allowed walls to fall down easily (Shrikhande et al., 2000).

Table 3.4 Summary of damages in 1991 Uttarkashi and 1999 Chamoli earthquake (DMMC, 2011)

	Earthquake induced losses	
	1991 Uttarkashi	1999 Chamoli
Human lives lost	768	106
Injured humans	5,066	395
Cattle lost	3,096	327
Fully damaged houses	20,242	14,724
Partially damaged houses	74,714	72,126

3.1.3.2 Hydrological disasters

Although the state is laid down on the active seismic zone, Uttarakhand is annually affected by hydrological phenomena especially due to the monsoon climate. Districts of Pithoragarh, Nainital, Garhwal and Dehradun receive 1,800mm as annual average of precipitation and other hill areas receive around 750mm-1,250mm annually. Uttarakhand falls in monsoon season between July and September, and 80-90% of total rainfall is recorded only during the season (Mani, 2013). Concentrated rainfall in monsoon induces frequent hydrological disasters, 42 events which killed at least one person were recorded and total 331 people were killed between 2000 and 2011 (Parkash, 2011).

The most devastating disasters in the state took place in June 2013 as Figure 3.6 and the summary of damage is show in Table 3.5. Due to unusual heavy rainfall induced flash floods and landslides, all 13 districts in Uttarakhand were affected by this incidents. Most severely affected district was Rudraprayag. High intensity rainfall of 375% above the daily average of monsoon season were recorded (Dube et al., 2014). Because of this flash flood and landslide two people were confirmed dead and 3,998 people were still missing (DMMC, 2014b). The reason why many people classified as missing is that their bodies are not identified yet and many people are still buried under the landslide. Though usually women are more likely to be victimized due to natural disasters, great number of men were also killed in this disaster, because the males were involved in the tourism business such as hotel staff and guide. Unplanned development along with the river, especially the facilities for tourists, causes such a huge impact, in



Figure 3.5 Damage of Uttarkashi earthquake (left) (Post, 2015), Damages of Chamoli earthquake (right) (PTI, 2011)



Figure 3.6 Damages of Uttarakhand disaster in 2013 in Rudraprayag district Left photo from Post, 2013. Right photo from News 18, 2013.



Figure 3.7 Burmola primary school destroyed by landslide at Bageshwar District (Taken on September 28th, 2014 by author)

addition, the flash flood and landslides took place in the season of pilgrimage. Due to the landslides, the road connectivity was totally disrupted and approximately 150,000 people were temporary stranded (DMMC, 2014b). The disaster is known as “Himalayan Tsunami” or “Kedarnath tragedy”, however this thesis called the disaster as “Uttarakhand disaster in 2013”, which is known internationally.

Table 3.5 Damages from Uttarakhand disaster in 2013 (DMMC, 2014b)

	Rudraprayag	Uttarakhand in total
Dead	2	169
Missing	3,998	4,021
Fully damaged houses	441	2,119
Domestic animals lost	2,771	5,091
Agricultural land lost (in ha)	4,279	11,481

This disaster impacted education sector as well. In Rudraprayag district, there were 594 primary schools, 117 upper primary schools, 54 high schools and 48 higher secondary schools. Out of these, 11 primary schools, four upper primary schools and two inter-collages were totally destroyed and seven primary schools and four upper primary schools, 41 inter-colleges were partially damaged. These damages are all in government schools, in addition, 12 private schools in Rudraprayag were also damaged (Rudraprayag, 2014). Students those who witnessed these events were traumatized and some students drew pictures of the situation of this disaster, which is one of the stress reaction due to the traumatic experiences. Although there is no available statistics on number of affected educational facilities every year due to landslide and flood, one school building which were totally destroyed by landslide, as Figure 3.7 shows, were observed during fieldtrip in Bageshwar in September 2014. According to a local resident, the Burmola primary school was hit by the landslide, which occurred on early morning of August 3rd, 2014. Since the buildings were not functional, students went to nearby community facility to attend classes. The school was constructed in high risk area due to the institutional problems, which is explained in different section.

Drought and forest fire are also common in Uttarakhand. People in Uttarakhand relies livelihood on agriculture, hence the drought brings serious impact against economy. Recently droughts occurred in 2006, 2008 and 2009 (Rautela, 2015). The state is suffered from forest fire every summer losing important resource for economy (Pande, 2012). According to the state forest department, every year more than 500 hectares of the land is burnt out and it recorded more than 4,500 cases of forest fire only in 2009. It only occurs in forest area hence it does not affect the education sector, forest conservation and forest fire protection is one of the main concern for local government.

3.2 Disaster risk management institution

3.2.1 National institutions on disaster risk management

3.2.1.1 Disaster Management Act, 2005

The present legal and institutional framework is based on the Disaster Management Act enacted in the year 2005, which objective is to realize the effective disaster management. The act prescribes the establishment

of National Disaster Management Authority (NDMA) chaired by prime minister of India as well as the State Disaster Management Authority (SDMA) and District Disaster Management Authority (DDMA) at following administrative levels as shown in Figure 3.8. NDMA has been mandated to implement the policies, plans and guidelines and has vision "to build a safer and disaster resilient India by a holistic, pro-active, technology driven and sustainable development strategy that involves all stakeholders and fosters a culture of prevention, preparedness and mitigation" (NDMA, 2015).

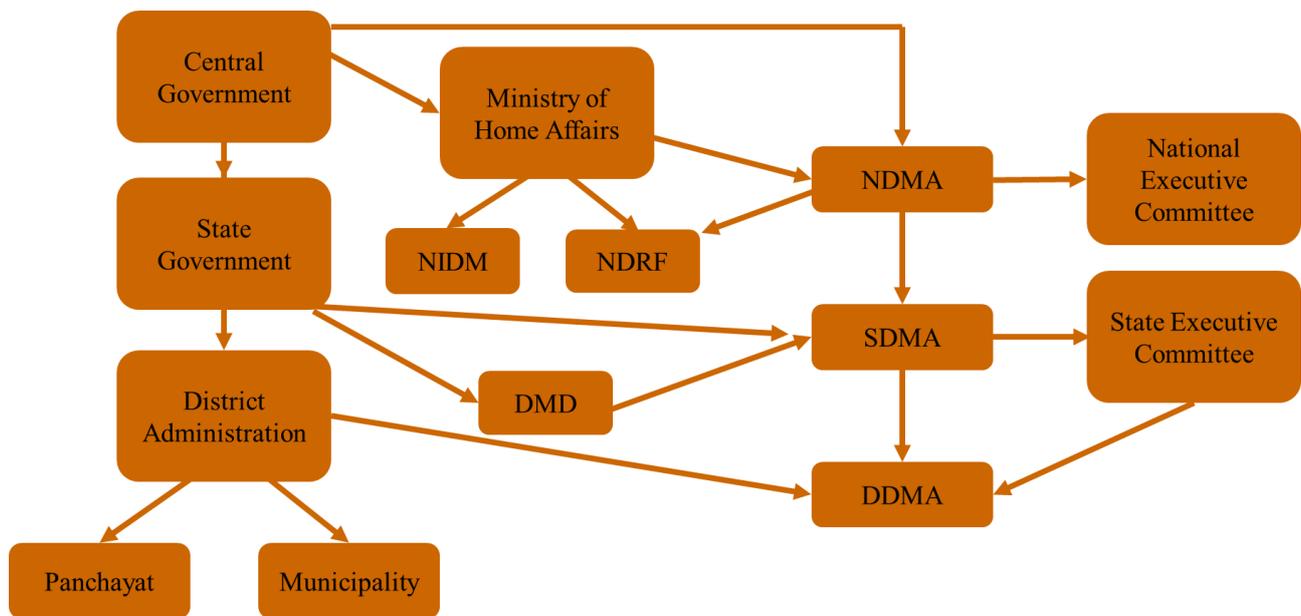


Figure 3.8 Legal institutional framework under Disaster Management Act 2005 (MHA, 2011)

National Executive Committee (NEC) is constituted under the act to play role to coordinate and monitor the overall disaster management related issues such as implementation of national policy and elaboration of national plan. The committee is chaired by Home secretary and consists of ministries and departments related to agriculture, atomic energy, defense, drinking water supply environment and forest, finance, health, power, rural development, science and technology, space, telecommunication, urban development and water resources (GoI, 2005). Therefore, it is worthwhile to mention that Ministry of Human Resource Development, which is responsible for education is not incorporated into the committee and there is not ensured the linkage between education and disaster risk management.

The act prescribes the establishment of two more institutions; National Institute of Disaster Management (NIDM) and National Disaster Response Force (NDRF). The Act 2005 has given a number of responsibilities to the NIDM such as the development of training modules, research and documentation related to disaster management, plan of training program conferences and institutionalization of disaster management (MHA, 2011). Therefore, the institute has four academic divisions of i) Geo-Hazard, ii) Hydro-met Hazard, iii) Policy planning and cross cutting and iv) Response. The institute is responsible for the planning of training and preparing for the training module for officials related to disaster management, and officials at district level has direct approach to community level. Therefore, this institute at national

level plays an important role to hand down the knowledge on DRR, which can fall under the category of non-formal education.

NDRF has responsibility to respond effectively in the situation of both natural and man-made disasters. There are eight battalions in 144 specialized teams, and they are trained to deal with different types of disasters such as chemical, biological, radiological and nuclear disasters in addition to natural disasters. 11 battalions are stationed in different part of India. Each battalion has zone of responsibility. In case of Uttarakhand, NDRF in Uttar Pradesh is the responsible battalion (NDRF, undated). NDRF is also given the role of carrying out community capacity building program and public awareness program, which are categorized as non-formal education.

3.2.1.2 National policy on Disaster Management

Disaster Management Act 2005 imposes NEC on responsibility to establish National Policy on Disaster Management. The policy was approved by Union Cabinet in 2009. The objectives are (NDMA, 2009);

- Promoting a culture of prevention, preparedness and resilience at all levels through knowledge, innovation and education
- Encouraging mitigation measures based on technology, traditional wisdom and environmental sustainability
- Mainstreaming disaster management into the developmental planning process
- Establishing institutional and techno-legal frameworks to create an enabling regulatory environment and a compliance regime
- Ensuring efficient mechanism for identification, assessment and monitoring of disaster risks
- Developing contemporary forecasting and early warning systems backed by responsive and fail-safe communication with information technology support
- Ensuring efficient response and relief with a caring approach towards the needs of the vulnerable sections of the society
- Undertaking reconstruction as an opportunity to build disaster resilient structures and habitat for ensuring safer living
- Promoting a productive and proactive partnership with the media for disaster management

From the educational perspectives, the policy prioritizes the disaster management training at educational institution. The policy is directed to foster the culture of preparedness through the knowledge and education and use of traditional knowledge which are both mentioned in HFA. In fact, this policy clearly stated that the approach which should be taken is community based disaster management, thus it targets to reach the community. Along with the prioritization of DRR education, together with the repeated tragedy in schools due to natural disasters, Government of India approved a National School Safety Programme (NSSP) which is targeted for the 43 districts of 22 states in which categorized under seismic zone IV & V, including State of Uttarakhand. NDMA is an implementing organization of the program in the partnership with Ministry of Human Resource Development that is in charge of education issues. Thus, national government has started the effort to promote DRR education based on the 2005 Act and the policy.

3.2.2 Uttarakhand state institution in disaster management

3.2.2.1 Background of disaster management in the state

State of Uttarakhand was created in 2000 and just before its establishment, the region was suffered from geophysical disasters such as 1991 Uttarkashi earthquake and 1999 Chamoli earthquake and chorological hydro-meteorological disasters in different places. Hence, the state has started their own initiatives to establish legal framework for effective disaster management. Before the enactment of the national Disaster Management Act, 2005 the state of Uttarakhand enacted the Uttaranchal Disaster Mitigation, Management and Prevention Act, 2005. Under the state act, Department of Disaster Management was created, which is the first separate department for disaster management at state level in India. Along with the department, an autonomous institution, Disaster Mitigation and Management Centre (DMMC) was established for addressing various disaster management issues. Governing body headed by Chief Secretary of the state as its ex officio chairperson is the decision making body for DMMC. Executive Director is responsible for routine management of the organization. Apart from Executive Director of DMMC, the organization has the hierarchy of Senior Executives, Junior Executives, Managers, Data Entry Operators and Technical Assistants. The main activities of DMMC include i) mass awareness, ii) capacity building, iii) policy planning, iv) database creation and updation and v) Hazard risk and vulnerability assessment. Soon after the state disaster management act, National Disaster Management Act 2005 was enacted. National act is superior to the state one, hence SDMA was established in 2007 and it consists of nine members as Table 3.6. However, state government is still in the transitional period from state Disaster Management Act to national Disaster Management Act, so that department of disaster management and DMMC are still functional.

Table 3.6 Composition of State Disaster Management Authority (DMMC, 2014)

No.	Portfolio
1	Chief Minister (Chairperson)
2	Minister, Disaster Management (Vice Chairperson)
3	Minister, Health and Family Welfare
4	Minister, Irrigation and Drinking Water
5	Minister, Transport
6	Minister Rural Development
7	Chief Secretary
8	Principal Secretary, Finance
9	Principal Secretary, Disaster Management

3.2.2.2 Role of state authority in disaster risk management

SDMA is given a role and responsibility as follows (DMMC, 2014a),

- lay down the state disaster management policy
- approve the state plan in accordance with the guidelines laid down by the National Authority
- approve the disaster management plans prepared by the departments of the government of the state

- lay down guidelines to be followed by the departments of the government of the state for the purposes of integration of measures for prevention of disasters and mitigation in their development plans and projects and provide necessary technical assistance therefor
- coordinate the implementation of the state plan
- recommend provision of funds for mitigation and preparedness measures
- review the development plans of the different departments of the state and ensure that prevention and mitigation measures are integrated therein
- review the measures being taken for mitigation, capacity building and preparedness by the departments of the government of the state and issue such guidelines as may be necessary

According to the given role, SDMA has established the state disaster management plan. From educational perspectives, the plan emphasizes the importance of creating mass awareness and capacity building of different kinds of stakeholders (DMMC, 2014). Even though the SDMA is installed, many roles are given to DMMC as it is still under transitional phase from Uttaranchal Disaster Mitigation, Management and Prevention Act to National Disaster Management Act. Hence, based on the state disaster management plan, capacity building for teachers and education for children are conducted. Besides, DMMC is also a nodal agency for implementing NSSP at state level, and Rudraprayag and Bageshwar districts are ongoing project site. Hence the authority is a major provider of DRR non-formal education at the state.

Emergency Operations Centre (EOC), is responsible for managing disaster related issues and coordinating the emergency situation with the support of various state government organizations. EOCs have been set up at both state and district level and are fully functional on 24 x 7 basis. Managing and operating state level EOC is another responsibility of DMMC. Since personnel under EOC are trained for search and rescue, they provide training for community volunteer to equip them with knowledge and skills to implement rescue operation as first responder.

To support functionality of DMMC and to coordinate accordingly with the guidelines, State Executive Committee (SEC) was established. SEC consists of Chief Secretary, Additional Chief Secretary, Secretary in Disaster Management, Secretary in Finance and Secretary in Medical and Health. It is given the role to restrict the entry of vehicle and person into disaster affected area, provide shelter, food, drinking water and required materials, remove debris and conduct search and rescue operation, to make available the resources for emergency response, to construct temporary bridges or other necessary stuff, to disseminate information to public to deal with disaster situation. Therefore, as mentioned, DMMC together with EOC are providing different kinds of educational programs for students, teachers and communities.

3.2.2.3. District Disaster Management Authority

In accordance with the provisions of Disaster Management Act, 2005, DDMA had been set up in all the 13 districts of the state. DDMA is in charge of planning, coordinating and implementing disaster management as per guidelines and policies. In addition, the DDMA is given the authority to examine the construction within the district territory and is able to ask for the improvement based on the safety standards (MHA,

2011). At district level, the district magistrate is a head of disaster management committee. The committee consists of education officer, superintendent of police, chief medical officer, and other districts officers designated by state government. In case of Uttarakhand, EOC is also installed at every district and managed by the respective DDMA. In a reality, DDMA functions based on the instruction from DMMC or district magistrate. There is the coordination committee participated by both disaster management officer and education officer, which can be the important factor to promote DRR education both in formal and non-formal education.

3.3 Educational institution

3.3.1 Education in India

The Constitution, national laws and schemes on education are reviewed in order to clarify the roles and responsibilities in national context.

3.3.1.1 Education in the Constitution of India

Both central and state governments share responsibility for education under the Constitution of India. Although the Constitution had given the authority to decide all the education-related issues to individual state within the jurisdiction, the Constitution was amended to incorporate the education into the Concurrent List in 1976. The List prescribes the items controlled by both central and state governments, and consequently central and state government jointly bear the responsibility for education. According to the amendment, central government issued the National Policy on Education (NPE) which was approved in the parliament in 1986 (NCERT, 2005). This policy recommended that India have common core component of school education throughout all over India, and it illustrated the basic idea of education. Apart from the NPE, the National Curriculum Framework (NCF) is influential to the formal education sector. NCF issued in 1986 aimed at unifying education at national level to realize the qualitative comparison of education in whole India. While the Indian education is in the direction of uniformity at national level, educational system remains different from state to state taking into consideration the linguistic and cultural diversities. Therefore, it should be noted that educational system in India is different from state to state although central government shows guidelines for education at national context.

3.3.1.2 Education for all movement in India

New amendment of the Constitution was made to include the concept of universal education in 2002. Article 21-A inserted to the Constitution stipulates to provide free and compulsory education for all children in the age group of six to 14 years as fundamental right (Government of India, 2009) According to the Article, the Right of Children to Free and Compulsory Education (RTE) Act, 2009 was enacted and it came into effect in April, 2010. In order to embody the concept of the Act, two national programs; Sarva Shiksha Abhiyan (SSA, Education for All) and Rashtriya Madhyamik Shiksha Abhiyan (RMSA, National Mission for Secondary Education) were launched by central government as education for all movement. Even in terms of the DRR education in formal education, universal education is necessary approach hence the educational effects reach to all the children.

SSA targets for the universal elementary education for the age group from six to 14 years old and the program is held in partnership with state governments. For the universal and quality education, SSA includes the capacity building of teachers, grants for developing teaching and learning materials, school lunch and improvement of school facilities such as classroom, toilet and drinking water (SSA, undated). SSA prescribes that ideal schooling distance as primary school is within the range of one km and upper primary school is within three km of range. In case the schooling distance does not meet the criteria, the program provides fund to open new school. Engineers are deployed at department of education at state and district levels to approve and monitor the construction based on the safety norms of construction.

While the SSA targets the primary education, RMSA aims to raise the enrolment rate to 90% at secondary education and 75% at higher secondary education (RMSA, undated). The program includes the reform of teachers' training and curriculum to enhance the quality of education especially in Science, Math and English classes, and installations of science laboratories and libraries are also planned under the program. As similar to SSA, RMSA also sets up the standard of schooling distances that secondary school should be within seven km of range and higher secondary school within ten km of range. The program provides fund for the construction to meet the mentioned criteria.

Thus, the programs for universal education are important, as DRR education in formal education can reach a larger number of students, and construction of new school buildings are included in the programs for extending education.

3.3.2 Education in Uttarakhand

The education system in India has differences from state to state. Hence, education in Uttarakhand is reviewed.

3.3.2.1 Education system in Uttarakhand

The elementary education consists of primary school from class one to five and upper primary school from class six to eight, which are free and compulsory education. Secondary education categorizes two years of secondary school and two years of higher secondary school. The basic structure is shown in Figure 3.9 and the terms in the Figure are common ones used in the state.

School management system in Uttarakhand is basically categorized into four modes. First is the central government school (central school or Kendriya Vidyalaya). This type of school is funded and managed by the central government, established under the Ministry of Human Resource Development. Second are state government schools that are entirely funded and managed by state department of education. Third are government aided schools managed by private sectors, however, the salaries of both teachers and non-teachers come from state department of education. Four they are private schools which are entirely funded and managed by private sectors. Depending on the forms of management, the adopted curriculums are different. Central government school adopts the curriculum of Central Board of Secondary Education (CBSE), which is developed by autonomous education board of Indian government, and around 9,000

schools adopt the curriculum all over the India. Uttarakhand State Board of Education follows the CBSE, however, some contents are customized into Uttarakhand's context. Hence the curriculum followed by State Board is called the CBSE pattern. State government schools and government aided schools follow this CBSE pattern. Besides, private schools follow curriculum of CBSE or Indian Certificate of Secondary Education (ICSE).

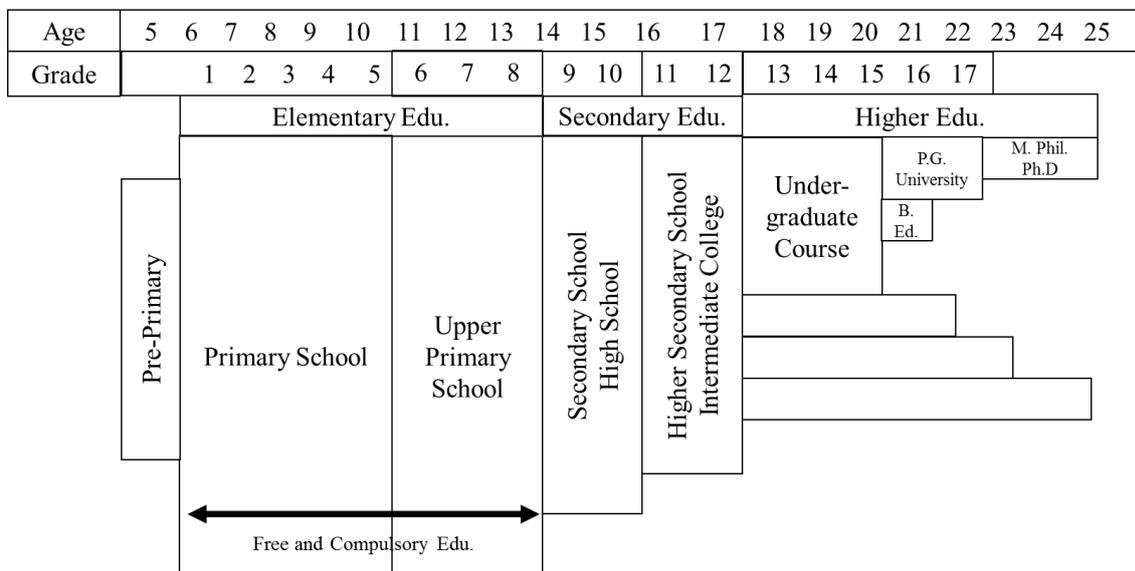


Figure 3.9 Uttarakhand State Education System

This research focus on the context of Uttarakhand state, therefore the management system adopted by state department of education and the curriculum of CBSE pattern are focused. In fact, 77.38% of primary and secondary schools are state government schools (Department of Education, 2015).

3.3.2.2 Educational institutions in Uttarakhand

State department of education is headed by the Secretary and consists of three divisions; primary education, secondary education and academic research and training as Figure 3.10 shows. Primary and secondary education have subordinate division at district and block level, and officers are deployed at each level. Chief Education Officer is the head of district department of education and one officer is assigned for each secondary education and primary education. Under the secondary education, there is School Examination Commission, which takes a role of implementing board examination for class ten and 12.

Academic research and training consists of two divisions. One is State Council of Educational Research and Training (SCERT), which provides teachers' training and develops training materials for teachers in addition to the curriculum development and evaluation. The other one is SIEMAT, the State Institute of Educational Management and Training. The institute is established for educational planning, management, research and evaluation. District Institute of Educational Training (DIET) is the institute which is in charge of giving training for teachers at district level and it is practically the subordinate organization of SCERT. In addition, pre-service teacher's training is conducted under DIET. Besides, though the figure do not

mention, offices for SSA and RMSA are installed at state department of education as well as district department of education.

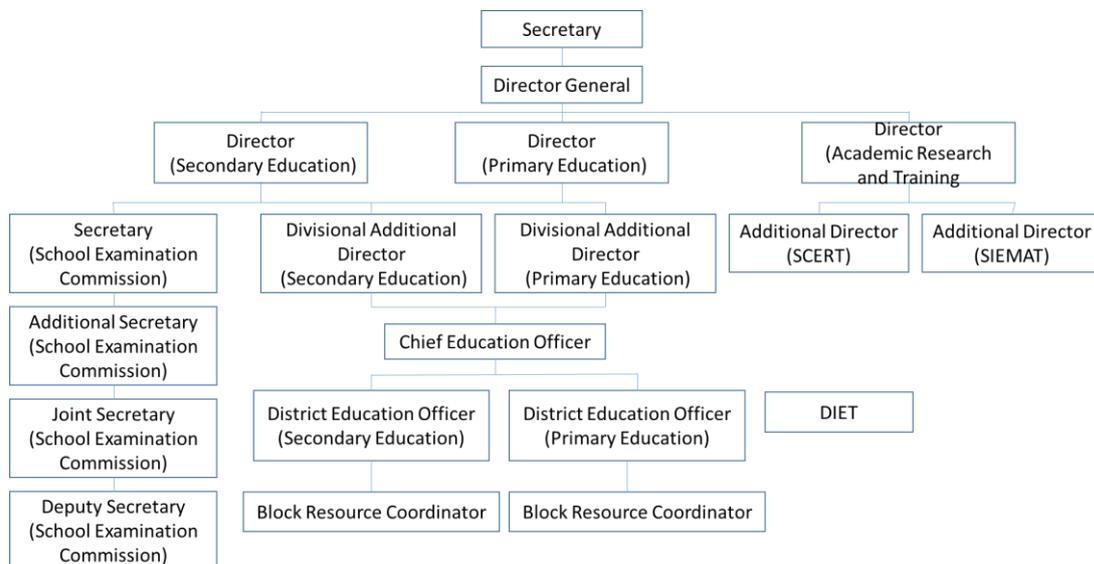


Figure 3.10 Structure of state department of education (State department of education, undated)

3.3.2.3 System of community participation at school management

School Management Committee (SMC) is a system that teachers, parents and community members get involved in the school management. The establishment of SMC at all government and government aided schools is prescribed in RTE Act 2009. In the year 2013-2014, SMC was established at 91% of schools in government and government aided schools in national level (DISE, 2014). The objectives of the establishment are (Government of Uttarakhand, 2011),

- To ensure the achievement of the objectives laid down by Right of Children to Free and Compulsory Education Act, 2009 for 6–14 years age group
- To ensure the participation of parents and teachers in the school management
- To ensure the community participation for the children's enrolment, retention and improvement of educational achievement level for the universalization of elementary education in accordance to the national policy of education
- To ensure the proper utilization of funds and other facilities provided by the government and other sources
- To develop ownership and sensitization of the community for the development of school

SMC at each school consists of two main bodies, general body and executive council. General body conducts periodical meeting and make opinions on school management, and its decisions are taken by the executive council. Members of general body are composed of the parents, all the teachers, Gram Pradhan or elected members of ward and Panchayat Secretary. From them, chairperson, vice-chairperson and member secretary are elected. The executive council consists of chairperson of the general body, secretary of the general body, Gram Pradhan or elected members of ward, the members amongst the parents elected

at general body, and Panchayat Secretary. The number of parents in executive committee varies from eight to 12 depending on the total number of students. Therefore, more than half of the executive body is occupied by parents.

SMC plays roles to prepare the school development plan, and to monitor the practices of the school and utilization of the fund (Government of India, 2009). Therefore, it is given the higher authorities compared with so-called Parents and Teachers association (PTA). There is a case in the state of Karnataka, India that SMC became the opportunity for community people to realize the lack of basic amenities in school. The situation caught attention of SMC members and succeeded in improving school amenities with the support of district government and SSA program. In addition, the same SMC realized the need to work for dropout students and successfully brought back ten children to school (AIF, 2011). The other case in the state of Orissa showed that community members and teachers in SMC implemented regular monitoring and tracking of attendance, and subsequently communicating with parents of children. It resulted to achieve the 100% of enrolment (Rout, 2014). Thus, SMC with the participation of community members improved the situation of schools.

Even though it is not prescribed in the act, SMC is given the power to propose the construction site of school building. In the state of Uttarakhand, all the land of state government schools are donated by community. Provided site tends to be disaster prone area because the community people are unwilling to provide the land which is adequate for dwelling or agriculture, and school basically requires the relatively large flat area for the construction especially for playground. Mountainous geographical feature of Uttarakhand has less flat land, therefore schools are tended to be constructed along with the river. Thus, SMC is an influential stakeholder who is necessary to consider the disaster risk management at school level including the structural safety of school building.

3.4 Stakeholders in DRR education in Uttarakhand

Thus, the institutions on DRM and education were reviewed. Taking into consideration the definition of three modes of education, formal education is provided by state department of education at state level, and district department of education at district level. Independent organizations for teachers' training are set up at state level and district level, respectively the SCERT and DIET. In the context of non-formal education, DMMC at state level and DDMA at district level are the implementer of DRR education for children as well as community. Besides, NSSP is implemented in Rudraprayag district. Therefore, these organizations are the objects of the survey in the context of formal and non-formal education.

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Chapter 4 Disaster risk reduction education in Uttarakhand

This chapter aims to describe the DRR education practices in Dehradun as urban context and Rudraprayag as rural context, based on the definitions of formal, non-formal and informal education. Representatives of the organizations involved in DRR education that were identified in Chapter 3 were interviewed. As a result, positive factors and challenges in implementing DRR education were extracted for formal and non-formal education. In addition, the interviews were also implemented in communities to identify the practices related with informal education.

4.1 Methodology

The field surveys were conducted in Uttarakhand two times, from August 16 to November 18, 2014, and from September 2 to September 23, 2015. DMMC was the host organization of the field survey. In the context of formal education, total two state level organizations, four district level organizations and 12 schools were interviewed adopting semi-structured interviews. At state level, state department of education was interviewed to identify the policies on education, the systems introduced to manage school and available safety norms for schools. SCERT was also interviewed to identify the curriculum, co-curricular activities and teachers' training related to DRR education. At district level, department of education at both Dehradun and Rudraprayag were interviewed to identify the local issues in education, present status of DRR education implementation, school management with DRR perspective, and safety of school buildings. Interviews at DIET at both Dehradun and Rudraprayag were carried to identify the organizational structure of DIET and the teachers' training relevant to DRR education. Furthermore, field visits to schools followed by interviews with school teachers were conducted to identify the situation of schools on the factors such as general situation of school, planning on disaster risk management, status of implementation of DRR education and co-curricular activities, and school safety. Most of the schools visited are named Inter College, however every school has primary or upper primary classes and teachers of primary and secondary education were interviewed. The interviews are listed at Table 4.1.

In the context of non-formal education, officials from DDMA in both Dehradun and Rudraprayag were interviewed on the various programs and projects conducted at school and community level. The semi-structured interviews of DDMA officials in Dehradun aimed to identify the function of DDMA and DRR related educational activities for students, teachers and community. Since DDMA Rudraprayag is in the phase of reconstruction and rehabilitation from Uttarakhand disaster in 2013, questions on the situation of reconstruction was also asked in addition to the sets of questions to DDMA Dehradun. Besides, UNDP is implementing the Urban Earthquake Vulnerability Reduction Project (hereafter UNDP-DMMC project) in collaboration with DMMC. Therefore, the unstructured interviews conducted focused on the components of project, activities implemented, and availability of educational programs. In Rudraprayag district, NSSP is ongoing project, hence the program outline of NSSP in Rudraprayag, and the activities implemented under NSSP were interviewed adopting semi-structured interview. The interview for NSSP was held twice to follow the status of implementation. The details of interview is listed in Table 4.2.

Table 4.1 Summary of interviews for formal education sector

Organizations	Interviewees	Methodology	Main items of questions	Date
State Department of Education, Uttarakhand	Deputy director Person in charge of SSA	Semi-structured interview	1. Law and policy 2. School management 3. Safety of school building	October 28, 2014
State Council for Educational Research and Training (SCERT)	Lecturer in syllabus and textbook Lecturer in charge of disaster management	Semi-structured interview	1. Curriculum 2. Co-curricular activities 3. Teachers training	September 15, 2014
District Education Office, Dehradun	District project officer Assistant engineer	Semi-structured interview	1. Localized issues in education 2. DRR education	September 18, 2015
District Education Office, Rudraprayag	District education officer in primary education Assistant engineer	Semi-structured interview	3. School management 4. Safety of school building	September 23, 2014
District Institute of Educational Training (DIET), Dehradun	Senior lecturer in charge of DRR education	Semi-structured interview	1. Structure of DIET 2. Teachers' training in DRR	September 15, 2015
District Institute of Educational Training (DIET), Rudraprayag	Principal of DIET Lecturer	Semi-structured interview		September 23, 2014
D.A.V. Inter College, Dehradun	Teacher (Social Science) Teacher (Psychology)	Semi-structured interview	1. Situation of school 2. Planning on disaster risk management	September 9, 2014
Gandhi Inter College, Dehradun	Principal Teacher (Social Science)	Semi-structured interview	3. Status of implementation of DRR education	September 10, 2014
Mangla Devi Inter College, Dehradun	Teacher (Social Science)	Semi-structured interview	4. Co-curricular activities 5. Safety of school building	September 10, 2014
CNI Boy's Inter College, Dehradun	Principal Teacher	Semi-structured interview		September 11, 2014

Phool Chand Nari Shirp Girl's Inter College, Dehradun	Teacher (English) Teacher (Social Science) Teacher (Science)	Semi-structured interview	September 11, 2014
Shri Guru Nanak Boy's Public Inter College, Dehradun	Principal Teacher	Semi-structured interview	September 11, 2014
B.S. Negi Government Inter College, Dehradun	Teacher (Chemistry) Teacher (Social Science)	Semi-structured interview	September 16, 2014
Nehru Academy Junior High School, Dehradun	Two teachers	Semi-structured interview	September 16, 2014
Government Inter College Rudraprayag	Principal	Semi-structured interview	September 26, 2014
Government Inter College Agastyamuni, Rudraprayag	Principal and 11 teachers	Semi-structured interview	September 24, 2014
Government Girl's Inter College Agastyamuni, Rudraprayag	Four teachers	Semi-structured interview	September 24, 2014
Government Inter College Kyunja, Rudraprayag	Principal Teacher (English)	Semi-structured interview	September 9, 2015

In the context of informal education, total five communities were visited to know especially three aspects namely, disaster experiences of community, availability of local knowledge and interaction among community people. Five communities, Bhagat Singh ward, Thano village, Simyand village in Dehradun district, and Agastmuni village and Bhanaj village in Rudraprayag district were selected to observe the differences of urban and rural area. The locations of each community are shown in Figure 4.1. As a whole, one of the criteria of selecting the communities was if the communities were affected by natural disasters before. The other criteria of selection was to observe the differences of situations within Dehradun and Rudraprayag, and between Dehradun and Rudraprayag.

Table 4.2 Summary of interviews for non-formal education sector

Organizations	Interviewees	Methodology	Main items of question	Date
District Disaster Management Authority (DDMA), Dehradun	District disaster management officer	Semi-structured interview	1. Function of DDMA 2. DRR related activities	September 14, 2015
UNDP-DMMC project	UNDP-DMMC project coordinator	Unstructured interview	1. Components of programs 2. Activities implemented 3. Availability of educational program	September 3, 2015
District Disaster Management Authority (DDMA), Rudraprayag	District disaster management officer	Semi-structured interview	1. Reconstruction from 2013 disasters 2. Function of DDMA 3. DRR related activities	September 22, 2014
NSSP Rudraprayag	Coordinator of NSSP	Semi-structured interview	1. Project outline of NSSP in Rudraprayag 2. Activities implemented under NSSP	September 22, 2014 September 7, 2015

Followings are the general situations of each community. Bhagat Sing ward is one of the wards of Municipal Corporation. Therefore, the ward is categorized as urban area with congested built environment. Thano village is located on the plains around 20 kilometers south-east of Bhagat Sing ward and outside of Municipal Corporation. In this context, village means that the administrative unit is under village panchayat. People in the village commute to the urban area of Dehradun while the village practices agriculture. Hence, it is regarded as suburban area. Simyand village, which is located next to the Thano village is mountainous and major livelihood is agriculture, hence the village is considered as rural area. In Rudraprayag district, Agastmuni village is relatively urbanized area in Rudraprayag and Bhanaj village is in the mountainous area. The photos of each community are shown in Figure 4.2. List of questions were prepared to ask disaster experience, availability of local knowledge and community interaction. The details of interviews are listed in Table 4.3.

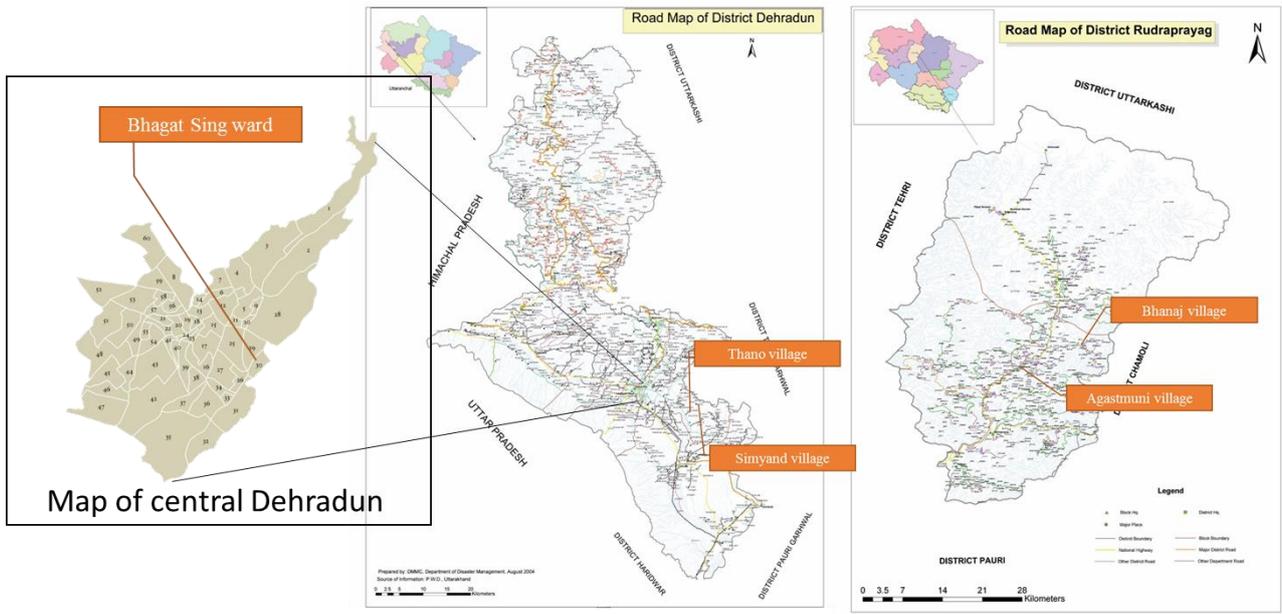


Figure 4.1 The locations of interviewed communities
(Maps were provided by DMMC)



Figure 4.2 Photos of interviewed community, Bhagat Singh ward (Left-above), Thano village (Right-above), Simyand village (Left-below), Agastmuni village (Center-below), Bhanaj village (Right-below)

Table 4.3 Summary of interviews for informal education sector

Communities	Interviewees	Methodology	Main items of question	Date
Bhagat Singh ward, Dehradun district	Prashad (Ward leader, Female) School principal (Male) Community member (Male, around 30 years old)			September 19, 2015
Thano village	Member of Gram Panchayat (Male) Eight community members (Five female, Three male)		1. Disaster experience	November 4, 2014
Simyand village, Dehradun district	Former Gram Pradhan A villager (48 years old)	Semi-structured interview	2. Availability of local knowledge	November 4, 2014
Agastmuni village, Rudraprayag district	A villager (Male, around 50 years old) Three school teachers (All female) A villager (Male, around 30 years old)		3. community interaction	September 25, 2014
Bhanaj village, Rudraprayag district	Gram Pradhan One villager (male, around 50 years old) One engineer (not from village)			September 9, 2015



Figure 4.3 photos of interviews, DIET Dehradun (Left) School (Middle) DIET Rudraprayag (Right)

4.2 Disaster risk reduction education in formal education

4.2.1 Results of the interviews in formal education

The results of the interviews in formal education is shown in this section. The results of the interviews for state department of education is shown in Table 4.4, and the results for SCERT is shown in Table 4.5.

Table 4.4 Results of the interviews for state department of education

Asked questions	Response
<law, policy>	
● Policy/law for universal education	● Under RTE act, SSA is implemented
● Policy relevant to DRR education	● No policy relevant to DRR education
<School management>	
● Promotion of SMC	● Yes, according to the provision of RTE act
● Safety perspective in SMC	● No, SMC is to promote universal education
● Promotion of School Disaster Management Committee	● No
<Safety of school building>	
● Applied safety norms to school building	● School building design by CBRI with all safety norms is prepared
● Mechanism of monitoring school building	● During construction, engineers monitor
● Budget allocation for each school to monitor facilities, equipment, infrastructure	● Yes, depending on the size of school

Table 4.5 Results of the interviews for SCERT

Asked questions	Response
<Curriculum>	
● Subjects includes DRR related contents	● Six subjects of curriculum have DRR related contents infused
● Difference between CBSE and Uttarakhand curriculum	● Curriculum and textbook of Social Science are modified into Uttarakhand context with DMMC support
● Recommendation or guideline on DRR education from central government	● No
● Mechanism of approving, monitoring and updating the curriculum	● All approved by core committee with academician
<Co-curricular activities>	
● Co-curricular activities conducted in Uttarakhand	● Yes, sports, festival, cultural program, drama, role play, NSS, NCC and Scout and Guide etc.
● Co-curricular activities related with DRR	● NSS, NCC and Scout and Guide
● Mechanism of conducting co-curricular activities	● In each school, teachers are assigned for co-curricular activities
<Teacher's training>	
● Mechanism of delivering training	● SCERT gives training to key resource person from DIET, then DIET replicates training for teachers
● Contents related with DRR education in training	● SCERT requested DIET to incorporate DRR contents into training after 2013

The results of the interviews for district department of education in Dehradun and Rudraprayag as well as the DIET in both district are shown in Table 4.6 and Table 4.7, and the results of the interviews for schools is shown in Table 4.8. In the column of “Common” indicates that the interviewed results are applicable to both Dehradun and Rudraprayag contexts. The results which are specific for Dehradun or Rudraprayag are shown in the column of “Dehradun” or “Rudraprayag”.

Table 4.6 The results of the interviews for district department of education

Asked questions	Common	Dehradun	Rudraprayag
<Localized information>			
● Major educational challenge	● -	● Increasing number of student result in lacking teachers	● Lack of teachers in rural area
<DRR education>			
● Promotion of DRR related activities in co-curricular activities	● -	● NCC, NSS and Scout and Guide are implemented	● NSSP is a main co-curricular activities
● Promotion of DRR related activities besides co-curricular activities	● No	● -	● -
<School management>			
● Promotion of the establishment of SMC	● Every schools are obliged to install SMC	● -	● -
● Promotion of the establishment of school disaster management committee	● No	● -	● -
<Safety of building>			
● Process of constructing new school	● -	● New construction or repair are held depending on the degree of deterioration	● SMC is responsible for the construction and engineers visit for monitoring
● School building newly constructed and repaired under SSA	● -	● 50 schools reconstructed and 69 schools repaired	● Not obtained
● Mechanism of monitoring school building	● No	● -	● -
● Budget allocated for monitoring facilities, equipment, and infrastructure	● Yes, designated fund is allocated for facilities of school maintenance	● -	● -

Table 4.7 The results of the interviews for DIET

Asked questions	Common	Dehradun	Rudraprayag
<Structure of DIET>			
● Structure of DIET	● DIET consists of seven units. one unit is designated for making Annual Work and Plan (AWP) and propose training with budget estimation	● -	● -
● The contents of training	● Mainly subject training for teachers	● -	● -
<Teachers training in DRR>			
● DRR related training	● -	● Yes, started in 2012 with the support of DMMC and DM cell	● DRR training discontinued because of no directive to continue
● Availability of educational materials for teachers on DRR	● -	● Yes, the materials are also supported by DMMC and DM cell	● Not available
● Mechanism of evaluating the outcomes of teachers training	● -	● DIET hires 25 academic staffs and they visit schools to evaluate.	● Not available

Table 4.8 The results of the interviews for schools

Asked questions	Common	Dehradun	Rudraprayag
<Planning on disaster risk management>			
● Preparative measures to disaster	● -	● One school out of eight have fire extinguisher	● One school has school disaster management plan elaborated under NSSP
● Incorporation of DRR related content into school planning and management	● -	● Eight schools in Dehradun does not have DRR related aspect in school management	● One school has school disaster management plan elaborated under NSSP
<Status of implementation of disaster education>			
● If school impart the subject/chapter on disaster management	● -	● All eight schools impart DRR education through the subject of Social Science	● All four schools impart DRR education through the subject of Social Science
<Co-curricular activities>			
● Implementation of DRR	● -	● Five schools out of eight	● Three schools are under

related activities		conducts DRR related activities	NSSP
● If school implement NCC, NSS and Scout and Guide	● -	● Five schools out of eight conducts one or more than one of them	● All four schools conduct one or more than one of them
<School safety>			
● Implementation of periodical check of school building	● No school implement periodical check	● -	● -
● If risk/vulnerability of school identified	● No school implement risk/vulnerability identification	● -	● -

In the interview at state level, state department of education stated that there was no policy relevant to DRR education. However, SCERT described that six subjects, which were Hindi, English, Environmental Education, Mathematics, Science and Social Science included the DRR related contents. This curriculum infusion of DRR contents were made because CBSE pattern originally infused the DRR related contents. Regarding the differences between CBSE curriculum and Uttarakhand curriculum in terms of DRR education, one chapter of

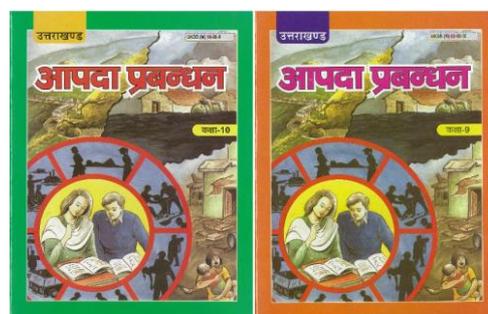


Figure 4.4 Disaster Management textbook Class nine (Left) Class ten (Right)

Social Science in class nine and ten was disaster management and the contents of the chapters were customized into the Uttarakhand context and the textbooks were also developed with the support of DMMC as Figure 4.4. This is the example that the formal education and non-formal education sectors were collaborated. Since the same curriculum is applied for both Dehradun and Rudraprayag, DRR education is implemented through the curriculum in both district. In the context of Dehradun district, DIET Dehradun incorporated the DRR related contents into teachers' training along with the development of materials for the training. Incorporation of DRR education into teachers' training and the material development were supported by DMMC and Disaster Management cell (DM cell), which consists of DDMA and department of fire, police and health, although these collaboration were made by each organizational effort and not institutionalized. These result suggested that DRR education through curriculum and teachers' training can be conducted without policy, with the support of external organizations specialized in DRR such as DMMC and DM cell.

Besides, while DIET Dehradun successfully incorporated the DRR education for teachers, DIET Rudraprayag discontinued the training because there was no indication from superior organization according to the interview. Curriculum implementation and teachers training are interlinked because the quality of curriculum implementation depends on the capacity of teachers' training. Hence, there is no

incorporation of DRR aspects into teachers' training in Rudraprayag is considered as a challenge.

Interview at SCERT also showed that the different types of co-curricular activities were held in the schools. Among different types of activities, the DRR related contents were observed in the scheme of National Service Scheme (NSS), National Cadet Code (NCC) and Scout and Guide. NSS is the scheme under Ministry of Youth Affairs and Sports to develop personality of students through community volunteers and some of the activities include first aid, evacuation drill, flood safety, search and rescue training and so on (NSS, undated). NCC is the scheme under military and aims to develop leadership of youth. The scheme organizes the camp and some of the programs in the camp have the training of search and rescue and first aid. While these schemes target the students of class 11 and 12, Scout and Guide are for students between class six and eight. The association of Scout and Guide, India is a branch of world scout association and the branch is recognized by Indian government. The Scout and Guide also has activities such as training on search and rescue, and first aid. As a result of school visits, these activities are held at five schools out of eight schools in Dehradun and all four schools in Rudraprayag. Thus, even though NCC, NSS and Scout and Guide are external scheme for department of education, it is collaboratively implemented in both Dehradun and Rudraprayag.

In addition to these three schemes, five schools out of eight in Dehradun implement DRR related co-curricular activities. The implemented activities include relief activities after Uttarakhand disaster in 2013, first aid training, knowledge on fire and earthquake safety, and do's and don'ts in case of disasters. One interviewed teacher stated that DRR related co-curricular activities were started to be implemented because the teacher received training from DMMC. Co-curricular activities are planned at individual school level in Dehradun and Rudraprayag, hence the incorporation of DRR education into co-curricular activities can be promoted by teachers' training on DRR education.

Curriculum, co-curricular activities and teachers' training discussed above are closely related with the educational contents delivered to students. However, school needs to be prepared for potential natural disasters. In the interviews, school management with DRR perspective was also asked. State department of education stated that the RTE act prescribes the establishment of SMC, however, there is no directives related with DRM. The results of interviews held at schools also show that the all eight schools in Dehradun as well as three schools out of four in Rudraprayag did not incorporate the DRR related aspects into school planning and management. Only one school has elaborated the School Disaster Management Plan under NSSP. SMC is not given the function to ensure the school safety from natural disasters and teachers are not specialized in the disaster risk management, the result of the interview suggests that external support is necessary for incorporating disaster risk management into school management.

Safety of school building is also important issue as schools were affected by flood and landslide in Uttarakhand. According to the state department of education, all the safety norms are applied for construction and the construction is monitored by engineers. However, the interviews at schools clarified that none of the schools in both Dehradun and Rudraprayag implement periodical check of school building as well as identification of the risk at school after the construction. These results show that the school

building is constructed under the monitoring of specialist, however there is no provision of checking structural safety after construction. Although Rapid Visual Survey of school building was conducted at one school in Rudraprayag under NSSP, the survey was implemented only once by an engineer. Lack of mechanism to check the school building and risk makes the school building vulnerable against natural hazards such as flood, landslide and earthquake.

4.2.2 Positive factors and challenges for better implementation in formal education

Based on the results of the interviews, positive factors could be summarized as follows,

Dehradun context

- With the support of external organizations specialized in DRR, DRR contents are infused teachers' training without policy

Common context

- With the support of external organizations specialized in DRR, DRR contents are infused into curriculum
- Teachers' training on DRM implemented by organizations specialized in DRR promote the infusion of DRR contents into co-curricular activities

Based on the results of the interviews, challenges are identified as follows,

Rudraprayag context

- The teachers' training on DRR discontinued because there was no indication from superior organization

Common context

- None of schools in Dehradun and Rudraprayag have mechanism of checking structural safety of school
- There is no provision of including DRM into SMC

4.3 Disaster risk reduction education in non-formal education

4.3.1 Results of interviews in non-formal education

The results of the interviews in non-formal education is shown in this section. The results of the interview for DDMA Dehradun and Rudraprayag and programs implemented in Dehradun and Rudraprayag are shown in Table 4.9 and Table 4.10.

In the interviews of UNDP-DMMC project and NSSP, the components of both programs were identified. In fact, both program commence from teachers' training followed by the development of school disaster management plan and the training for students. UNDP-DMMC project is implemented by DMMC and NSSP is implemented by multi-stakeholders' committee including DDMA. The result of the interview suggests that non-formal education sector collaborated with formal education sector as teachers were trained. At the same time, both programs consider teachers as entry point to incorporate DRR education and school management with DRR perspective into school.

Table 4.9 The results of interviews for DDMA Dehradun and Rudraprayag

Asked questions	Dehradun	Rudraprayag
<Function of DDMA>		
● Main function of DDMA	● Most frequent disaster is car accident and overflow of drainage. Main function is to solve those problems with relevant department.	● Reconstruction and rehabilitation from 2013 disasters and improvement in communication system
<DRR related activities>		
● Implementation of DRR related activities for student at school	● No	● School rally, competition of essay, paintings, debate are held
● Implementation of DRR related activities for teacher	● No	● NSSP is covering this part
● Implementation of DRR related activities for community	● Disaster action plans established at 700 communities	● Rescue specialists of DMMC stationed in Rudraprayag give training on search and rescue and first aid for community volunteers
<Reconstruction from 2013 disasters>		
● Situation of reconstruction/rehabilitation	● Not asked	● Improvement of communication means are mainly implemented because the communication was cut during disasters
● Lessons learned reflected	● Not asked	● New communication station with 2-3 personnel with satellite phone, new mobile tower were installed

Table 4.10 Results of interviews for UNDP-DMMC project and NSSP

Asked question	Dehradun	Rudraprayag
<Project outline>		
	UNDP-DMMC project	NSSP
● Target of the program	● Schools in urban Dehradun	● 200 schools and 500 teachers
● Procedure/Criteria of selecting schools	● Inter College	● Schools with large number of students
● Organization involved	● One coordinator Implemented by DMMC	● One coordinator Implemented through multi-stakeholders committee
<Activities in the component>		
● Component of program	● Teachers' training Establishment of school disaster management plan and committee Training of students on search and rescue, first aid and fire safety Development of educational materials	● Teachers' training Establishment of school disaster management plan Mock drills at individual school Rapid Visual Survey of school building Demonstrative retrofitting
● Opportunity for parents and community to participate at program	● No	● No

Formal education and non-formal education were thus collaborated, however, both program do not promote the participation of parents and community residents. As Chapter 2 pointed out, the school can function as a hub to disseminate the DRR knowledge to the community through informal means, hence the promotion of parents and community should be taken into consideration.

Besides, one feature specific for Rudraprayag context is observed in the implementation of DRR education. In the interview at DDMA Rudraprayag, it was identified that community training is given with the support of rescue specialists from DMMC. Besides, multi-stakeholders committee are set up for the implementation of NSSP while UNDP-DMMC program was mainly implemented by DMMC. The committee of NSSP consists of district magistrate, officer of health department, officer of education department, superintendent police, officer from fire department, district disaster management officer and coordinator of NSSP. It implies that cooperation of different stakeholders promote the implementation of DRR education in Rudraprayag.

4.3.2 Positive factors and challenges for better implementation in non-formal education

Based on the results of the interviews, positive factors could be summarized as follows,

Rudraprayag context

- Cooperation of different stakeholders promote the implementation of DRR education

Common context

- For non-formal education, teachers is the key to incorporate DRR education and school management with DRR perspective into school

Based on the results of interview, challenges are identified as follows,

Common

- UNDP-DMMC project and NSSP do not promote the participation of parents and community residents

4.4. Disaster risk reduction and Informal education

4.4.1 Results of the interviews in informal education

Overall result is shown in Table 4.11. Left column of Table 4.11 indicates the asked questions and obtained answer is shown in the right side of the columns.

In terms of disaster experiences of each community, Bhagat Sing ward, Simyand village in Dehradun and Agastmuni village and Bhanaj village were recently affected by natural disasters, although the landslide at outskirts of community in Thano village did not affect directly the community. Especially the Simyand Village and Bhanag village are located in mountainous areas and the villages are affected by landslide every year. The questions about local knowledge are asked in different ways. Local knowledge is proved its effectiveness through the time-testing over generations (Sharma, 2008). Throughout the interviews, different types of knowledge were observed, however there was no evidence to say that they were locally shared and time-tested. One knowledge observed in Simyand village is about predicting heavy rainfall

Table 4.11 Results of the interviews in informal education

Community	Bhagat Sing Ward	Thano village	Simyand village	Agastmuni village	Bhanaj village
Asked questions	Dehradun	Dehradun	Dehradun	Rudraprayag	Rudraprayag
Disaster experiences					
● Past disasters happened in the area	● Flood (2010, 2013)	● Landslide at outskirts of community	● Landslide (every year)	● Flood (2013)	● Landslide (every year), rock fall, Flood (2013)
Local knowledge					
● Monument related with past disaster	● Not found	● Not found	● Not found	● Not found	● Not found
● Knowledge to predict landslide	● Not found	● Not found	● Not found	● Not found	● Observe dried trees to predict surface erosion
● Knowledge to predict rain	● Not found	● Not found	● Read color of clouds for predicting heavy rainfall	● Not found	● Not found
● Knowledge to predict earthquake	● Not found	● Not found	● Not found	● Not found	● Not found
● Structure which is resistant to natural disaster	● Not found	● Not found	● Not found	● Not found	● Constructing houses on cutting site
Community interaction					
● Existing community organization	● Not found	● Mangal group to tell opinion of villagers to village leader	● Not found	● Not found	● Not found
● Community activities	● NGOs and religious group organize community activities	● Not found	● Not found	● Not found	● Not found
● Community based group such as youth group, woman group etc.	● Not found	● Not found	● Not found	● Not found	● Not found
● Other opportunities of interaction	● Not found	● Not found	● Not found	● Play ground	● Not found

reading color of clouds. Depending on how dark the color is, rainfall is predicted. Another knowledge is about surface erosion. It is said that one specific kind of tree dries up, surface erosion may happen. The other knowledge about the construction of houses on cutting site is stated by engineer. People cut mountain slope and build houses on the cutting site, not an embankment site. Because the land of cutting site is more firm than embankment side. Therefore, it is stronger against earthquake.

The justification that three of knowledge observed at Simyand village and Bhanaj village listed in Table 4.11 was considered as local knowledge was as follows. In case of the knowledge on reading the color of clouds to predict heavy rainfall in Simyand village, 48 year-old man whose family has lived in the village for 250 years stated that most of the people know the knowledge. In addition, the Gram Pradhan also stated the same knowledge in the interview held in the different place. In case of the knowledge on construction on cutting site in Bhanaj village, same kind of construction style was still widely observed in the same village. It implies that the knowledge is shared among the community. The other saying about dried trees in the Bhanaj village is first told by the Gram Pradhan, and same knowledge was asked to another villager and the village as well knew the knowledge. Therefore, three of them are categorized as local knowledge. As local knowledge should be scientifically proved its effectiveness (Gaillard and Mercer, 2013), this aspect is the limitation in the result of interview. One common point between Simyand village and Bhanaj village is that both are located in the middle of mountain and there is no plain area. Both villages are affected by landslide every year, and due to the high frequency of disaster they possess some knowledge.

In terms of community interaction, urban community of Bhagat Sing ward has opportunities of interaction among community members due to the NGOs and religious group activities. Thano village has also periodical meeting of Mangal group, which group is composed of community members, and community members can share the issues and needs, and the opinion to Gram Panchayat. In case of Agastmuni village, there is a playground and people and children come to exercise, therefore the playground function as the informal interaction of community. However, the two communities, Simyand village and Bhanaj village did not have the opportunities identified through the interview. The possible factor to weaken the interaction of community in Simyand and Bhanaj are the mountainous landscape and the physical distance of houses.

4.4.2 Key findings in informal education

Based on the interview, followings are identified.

Bhagat Sing ward as urban context

- With the initiative of NGOs and religious group, opportunities for interaction are made.

Simyand and Bhanaj villages as rural context

- Local knowledge is fixed to the community where disaster strike every year
- Mountainous landscape interrupts the interaction of community members

Based on the results of interview, challenges are identified as follows,

- Scientific validation of local knowledge is not held

4.5 Summary of the Chapter

Interviews were conducted to investigate DRR education in the context of formal, non-formal and informal education. In terms of the curriculum, co-curricular activities, and teachers' training, their implementation of DRR education in formal education context require the support of organization specialized in DRM as formal education sector does not have specialized knowledge on DRM. Besides, the result of the interview for formal education as well as non-formal education suggests the important role of teachers in incorporating DRR education and DRM into school. It was found that there is neither provision of checking the structural safety nor DRM in school management. Giving knowledge to teachers promote the incorporation of these perspectives at schools. In addition, both UNDP-DMMC and NSSP do not promote the parents and community participation for school activities. If the linkage between school and community become stronger, the informal means of knowledge transfer would be utilized effectively. In urban area, NGOs and religious group made an opportunity to interact among community people. This interaction would help to disseminate the DRR knowledge into community. In rural area, especially in Rudraprayag, the mountainous landscape interrupts the interaction of community members, therefore, the school can play a role as a hub to disseminate DRR knowledge through community participation in school DRR activities. The overall challenges in the context of formal and non-formal education were identified as Table 4.12. The column of "Common" means the challenges for both Dehradun and Rudraprayag contexts. In case of the challenges specific for Dehradun or Rudraprayag, they are listed in the column of Dehradun or Rudraprayag.

Table 4.12 Challenges in formal and non-formal education

	Common	Dehradun	Rudraprayag
Formal	<ul style="list-style-type: none"> ● No mechanism of checking structural safety of school ● No provision of DRM in school management 	<ul style="list-style-type: none"> ● As listed in the column of "Common" 	<ul style="list-style-type: none"> ● The teachers' training on DRR
Non-formal	<ul style="list-style-type: none"> ● No parents and community participation to school DRR activities 	<ul style="list-style-type: none"> ● As listed in the column of "Common" 	<ul style="list-style-type: none"> ● As listed in the column of "Common"
Informal	<ul style="list-style-type: none"> ● Scientific validation of local knowledge is not held 	<ul style="list-style-type: none"> ● 	<ul style="list-style-type: none"> ●

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Chapter 5 Assessment of disaster risk reduction education in Uttarakhand

This chapter aims to measure the present implementation status, positive factors and challenges of DRR education in Dehradun and Rudraprayag in terms of three modes of education. Institutionalization Indexes of Disaster Risk Reduction Education (IDRE) were developed based on the literature reviews on DRR education (Chapter 2) and institutions (Chapter 3), practices of DRR education in Dehradun and Rudraprayag (Chapter 4) and additional literature reviews. The process of development is shown in the section 5.1. Based on the developed indexes, the index based survey was held for respective stakeholders involved in DRR education and its results are shown in the section 5.2. In addition, FGD was held based on the results of IDRE index survey in both Dehradun and Rudraprayag, which results are shown in section 5.3.

5.1 Development of Institutionalization Indexes of Disaster Risk Reduction Education (IDRE)

IDRE consists of three qualitative indexes of formal, non-formal and informal education. Hereafter, the process of development and contents are described.

5.1.1 Format of IDRE

Formal education index consists of five components, while non-formal and informal education indexes have three components as Figure 5.1 shows. Below each component, there are three sub-components. Each three sub-component is measured through five variables. Therefore, formal education index has total 75 variables, and non-formal education and informal education indexes have 45 variables to measure the status of implementation.

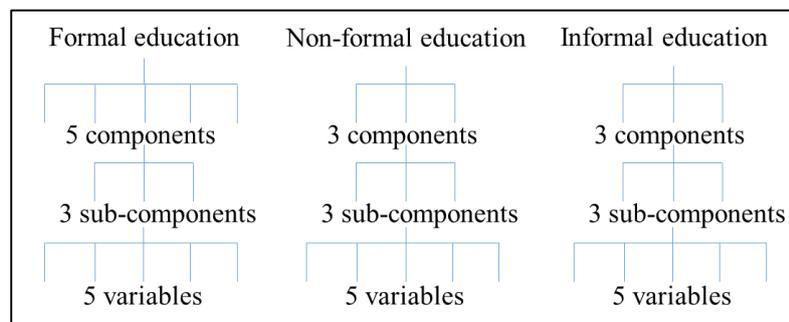


Figure 5.1 Structure of indicators

5.1.2 Development of formal education index

This subsection describes the contents of formal education index to measure the degree of implementation of formal education. Formal education is delivered in the school framework based on institutionalized education system, and as Chapter 2 clarified, formal DRR education covered policy framework, curriculum, teachers' training and safety of school buildings. In addition to these, DRR education in Uttarakhand is implemented through co-curricular activities. Taking these aspects into consideration, it is reasonable to measure the formal education through five components: policy, curriculum, co-curricular activities, teachers' training and school building. These components are divided into sub-components to measure each aspect of the components. All contents of formal education index are shown in Table 5.1.

Table 5. 1 Formal education index

Components	Sub-components	Variables
Policy	Application of Policy Framework	(1) Political commitment/legal framework for ensuring the universal education in compulsory education.
		(2) Political commitment/legal framework for mainstreaming disaster education.
		(3) Political commitment/legal framework for promoting the integration of disaster education into formal education.
		(4) State education policy for promoting the integration of disaster education into formal education.
		(5) Involvement of multi-stakeholders in policy making process for the integration of disaster education into formal education (Ex. Cross-departmental committee)
	Level of Policy Implementation	(1) Implementation scheme to ensure the universal education in compulsory education.
		(2) Monitoring mechanism of implemented scheme for the universal education in compulsory education.
		(3) Implementation scheme for integration of disaster education into formal education.
		(4) Availability of monitoring mechanism of implemented scheme for integration of disaster education into formal education.
		(5) Involvement of multi-stakeholders in policy implementation and monitoring for the integration of disaster education into formal education.
	Evaluation of Policy Implementation	(1) Institutional mechanism of evaluating policy achievement.
		(2) Policy achievement in universal education in compulsory education.
		(3) Policy achievement in integration of disaster education into formal education.
		(4) Institutional mechanism of reflecting evaluation and achievement into policy making process.
		(5) Involvement of multi-stakeholders in policy evaluation for the integration of disaster education into formal education.
Curriculum	Curriculum in disaster risk management	(1) Disaster education is specified in the curriculum.
		(2) Incorporation of contents on disaster management in school curriculum.
		(3) Contents on disaster management are localized in the context of Uttarakhand
		(4) Class hour which contains the contents on disaster management in school curriculum.
		(5) Involvement of multi-stakeholders in curriculum development in terms of the content on disaster management.
	Textbook	(1) Textbook referred to disaster management contents along with the curriculum.
		(2) Content of textbook on disaster management are localized in the context of Uttarakhand

		(3) % of accessibility to textbook (if textbook is issued enough number, all the students are accessible.).
		(4) Institutional mechanism of official approval of textbook
		(5) Involvement of multi-stakeholders in textbook development on disaster management.
		(1) Availability of educational goals for evaluating students' achievement on disaster management content at curriculum.
		(2) Availability of periodical evaluation and revision of curriculum on disaster related contents.
	Evaluation	(3) Availability of periodical evaluation and revision of textbook on disaster related contents.
		(4) Institutional mechanism to reflect feedback on curriculum from individual schools and teachers to curriculum development
		(5) Involvement of multi-stakeholders in evaluation and revision of curriculum and textbook on disaster related contents.
		(1) Incorporation of contents on disaster management into co-curricular activities.
		(2) % of schools that incorporate disaster management contents into co-curricular activities.
		(3) Frequency of co-curricular activities on disaster management
	Implementation	(4) Contents of co-curricular activities on disaster management customized for local context.
		(5) Involvement of multi-stakeholders in implementing co-curricular activities on disaster management.
		(1) Educational materials prepared for co-curricular activities on disaster management.
		(2) Contents of educational materials on disaster management are customized for local context of Uttarakhand
Co-curricular activities	Manual/Textbook/Tools	(3) % of accessibility to educational materials (if educational material is issued enough number, all the students are accessible.)
		(4) Availability of equipment and instrument for conducting co-curricular activities on disaster management
		(5) Involvement of multi-stakeholders in elaborating educational materials for co-curricular activities on disaster management.
		(1) Availability of educational goals for evaluating students' achievement in the component of disaster management.
		(2) Availability of periodical evaluation and revision of co-curricular activities.
	Evaluation	(3) Availability of periodical evaluation and revision of educational materials
		(4) Institutional mechanism to reflect feedback on curriculum from individual schools and teachers to curriculum development

		(5) Involvement of multi-stakeholders in evaluation and revision of co-curricular activities and educational materials.
Teacher's training	Implementation	(1) % of the teachers who received training
		(2) Incorporation of the training contents on disaster management
		(3) Incorporation of the training contents on school safety (school buildings, facilities)
		(4) Trainer specialized in disaster management to provide training for teachers
		(5) Involvement of multi-stakeholders in implementing training on disaster management
	Manual/Textbook	(1) Manual/textbook on disaster management for teacher's training
		(2) Contents of manual/textbook on disaster management are localized in the context of Uttarakhand.
		(3) Manual/textbook is prepared with the aim of promoting the teaching capacity of teachers along with the school curriculum.
		(4) Manual/textbook includes the contents on school safety and security such as check of school buildings and facilities.
		(5) Involvement of multi-stakeholders in developing manual/textbook for training on disaster management
Evaluation	(1) Availability of training goals to evaluate teachers in teacher's training on disaster management component.	
	(2) Availability of periodic evaluation and revision of teacher's training on disaster management component	
	(3) Availability of periodic evaluation and revision of textbook/manual on disaster management training	
	(4) Institutional mechanism to reflect feedback of teacher's training to training contents development	
	(5) Involvement of multi-stakeholders in evaluation of teacher's training	
School buildings (Structural and non-structural)	Safety in School Building	(1) Availability of design of school building with all safety norms
		(2) Institutional mechanism of supervision by expert during new construction
	School Location	(3) Institutional mechanism for supporting the School Management Committee
		(4) Institutional mechanism for periodical structural check of school building
		(5) How many schools are newly constructed or under construction under SSA program out of all planned/proposed construction by SMC (please specify in %)
School Location	(1) % of schools that follows the norms of SSA and state education policy in terms of distance	
	(2) Availability of norms to restrict school location from the viewpoint of safety (flood, landslide etc.)	
	(3) Availability of safety norms to ensure the safety in route that students use	
	(4) Availability of geological and geographical survey before the construction (if checked by specialist)	

	(5) Investigation of the past disaster to decide new school construction site
	(1) Availability of norms for safety in non-structural aspect
	(2) Availability of periodic monitoring mechanism of non-structural aspect from safety perspective
Safety in Non-structural Aspect	(3) Availability of periodic monitoring mechanism of school facilities from safety perspective Availability of periodic monitoring mechanism of school area from safety perspective (if there is no risk of falling down rocks, trees, etc.)
	(4) Institutional mechanism to conduct needs assessment of individual schools to improve non-structural component.
	(5) Budget allocation for improving non-structural aspect from safety perspective per year

5.1.2.1 Policy

Policy “is a course of government action (or inaction) taken in response to social problems” (Kraft and Furlong, 2004). Thus, it is a basic tool for government to solve the social problems with financial and technical basis. As formal education is delivered by the governmental authorities, considering the policy aspects is to be taken into consideration. To describe the index for policy aspects it is necessary to explain about a policy cycle. A policy cycle follows the order of strategic thinking, development of policy, implementation of policy and evaluation of policy (Economic Policy Unit, undated). Strategic thinking and development of policy indicate the process of identifying the social issues and set up appropriate manner to solve the issues, thus they function to frame the policy. Based on this frame, policy is implemented and the outcomes are evaluated for next policy development. Therefore, it is called policy cycle. Adopting this concept, sub-components are established as follows; i) Application of policy framework, ii) Level of policy implementation and iii) Evaluation of policy implementation. Three sub-components in this context concern the policy of DRR education and universal education. The aspect of universal education is included because even if the DRR education is promoted, it does not reach to individual students if enrollment rate is low as discussed in Chapter 3.

The first sub-component is application of policy framework. This aspect is able to measure through the applied political commitments, legal frameworks and policies to promote DRR education and universal education. In addition, involvement of different stakeholders in policy making is included as one of the variables, as multi-sectoral collaboration is also highlighted in priorities for action 1 of Hyogo Framework for Action (HFA, 2005). There was also a successful case of multi-sectoral collaboration in India in which NDMA worked with ministry which was in charge of education to promote the integration of the DRR education into formal education. This resulted in implementing NSSP in India.

The second sub-component is level of policy implementation. Gerston (2010) describes that the important elements of policy are actors, resources and institutions among the others. Therefore, implementation scheme of both DRR education policy as well as universal education policy is measured taking into

consideration the aspects of actors, resources and institutions. Besides, mechanism of monitoring policy implementation promotes effective implementation of policy. Hence this aspect is also included as variable.

The third sub-component is evaluation of policy implementation to measure the effectiveness. The essence of policy evaluation is “what happened after implementing the program and what happened if the program was not implemented” (Mohr, 1988). Therefore, objective and goal of policy, degree of achievement in both DRR and universal education are included as variables. Besides, the mechanism of reflecting evaluation into policy making process is measured because the outcome of the present policy should be reflected to next policy.

5.1.2.2 Curriculum

Curriculum prescribes the educational contents which is delivered directly to students. Thus curriculum is a fundamental element of formal education. Petal et al. (2009) pointed out the process of infusing DRR related contents into curriculum was, as first step, to examine what kind of DRR related contents were already infused, and ,as second step, to develop contents as well as textbooks. Importantly, curriculum implementation should be evaluated and the contents should be periodically updated. Therefore, the curriculum component is measured through three sub-components namely; i) Curriculum in disaster risk management, ii) Textbook and iii) Evaluation.

The first sub-component, curriculum in disaster risk management measures the degree of infusion of DRR contents into curriculum. Therefore, variables such as availability of DRR related contents in the curriculum, availability of localized contents, and degree of infusion of DRR related contents into curriculum are included.

The second sub-component is textbook. Textbook should be considered in different context from curriculum even though the textbook is basically elaborated based on the curriculum. This is because the textbook shows the key concepts and core knowledge with clarity and it introduces the various examples and applications of knowledge (Oates, 2014). As variables of this sub-component, degree of infusion of DRR related contents into textbook, its localization, and accessibilities to textbook are selected. In case of the state of Uttarakhand, textbook is given with free of cost up to class eight. However, textbook delivery is delayed especially in rural area. Therefore, the accessibility of textbooks for students can be one parameter to measure the implementation of education.

The third sub-component is evaluation. Evaluation is associated with objectives and implementation (NCERT, 2006). Therefore, the variables measure the availability of educational goals, evaluation mechanism of department of education, availability of periodical evaluation and revision of curriculum and textbook, and mechanism to reflect feedback from teachers.

From the perspective of institutionalization, involvement of multi-stakeholders is selected as one variable in each sub-component. There is an example of the successful collaboration of education department and DMMC to develop curriculum and textbook as shown in Chapter 4, which allows to bring scientific DRR knowledge into education field.

5.1.2.3 Co-curricular activities

The component of co-curricular activities has the same structure as curriculum which consists of i) implementation, ii) Manual/textbook/tool and iii) Evaluation. It includes some similar variables with curriculum, however it has different variables as well to measure the co-curricular activities. For example, contents and frequency of co-curricular activities are different from schools and if the program such as NSSP is applied as Chapter 4 indicates. Therefore, the degree of incorporation of co-curricular activities with DRR related contents, and frequency of co-curricular activities are included as variables of implementation. In terms of manual/textbook/tool, co-curricular activities often requires manual, textbook or tools to implement. Therefore, the factors which are reflected to index are different between manual/textbook/tool of co-curricular activities component and textbook of curriculum component. Sub-component of evaluation is the same as one of the variables for the curriculum components. However the curriculum is evaluated directly by the education department, while co-curricular activities are evaluated by schools or evaluated under scheme of NSS, NCC, Scout and Guide and NSSP. Therefore, the institutional mechanism of evaluation is different, and they are measured in different context.

5.1.2.4 Teachers' training

The importance of teachers' role is pointed out in Chapter 2 as well as Chapter 4. Teachers' capacity influences the quality of education and teachers can take a role in disaster risk management at school as well as community level. Therefore, capacity building of teachers is important for both effective DRR education and disaster risk management at school. DIET Dehradun works positively on DRR related training for teachers. DIET implements the training with manuals, and the training outcomes are evaluated by academic staffs of DIET. As this example shows, teachers' training can be measured through the sub-components of i) Implementation ii) Manual/textbook and iii) Evaluation.

The first sub-component, implementation includes the variables to measure the coverage of teachers training, degree of incorporation of DRR related contents, availability of trainers specialized in DRR, and the involvement of multi-stakeholders. Regarding the involvement of multi-stakeholders, DIET Dehradun has collaborated with DRR related organization to elaborate manuals and implement teachers' training as explained in Chapter 4. Thus, there is a successful example of implementing training in the state.

The second sub-component is manual/textbook. There are differences in availability of manuals on teachers' training between DIET Dehradun and DIET Rudraprayag. Thus, availability of manual is one of the variables. In addition, teachers' training implemented by education department aims to improve teaching capacity of teachers. As various subjects infuse DRR contents, improvement of teaching capacity leads to enhance effectiveness of curriculum. Hence, this aspect is also reflected as one of the variables.

The third sub-component is evaluation. Evaluation is already explained in the context of previous components of curriculum, and its variables are same. However, teachers' training is evaluated by SCERT and DIET, while curriculum is evaluated directly under department of education. Thus, under compartmentalized situation, index also should be separated to measure the present situation.

5.1.2.5 School buildings (Structural and non-structural)

Structural and non-structural safety is the fifth component of formal education. As described in Chapter 2, Chapter 3 and Chapter 4, this aspect should be taken into consideration to ensure the physical safety of students. Besides, vulnerable school buildings to any kind of disasters can weaken the effects of DRR education. The awareness and knowledge of students cannot make up for the damage caused if the school building itself is destroyed by sudden landslide attacks. For ensuring the structural and non-structural safety of students, strength of school buildings, constructed site and non-structural safety are three important aspects. Therefore, sub-components are established as i) Safety in school buildings, ii) School location and iii) Safety in non-structural aspect.

Regarding the first sub-component, safety in school buildings is measured through different types of variables. For the structural safety of buildings, basic design with all safety norms is particularly important and mechanism of supervision during the construction determines the structural strength. In case of Uttarakhand, engineers are deployed and SMC is responsible for the monitoring of construction. Thus, the availability of design, mechanism of monitoring by engineers and SMC are adopted as the variables.

The second sub-component is school location. Availability of different types of norms are adopted as variables such as schooling distance, distance from river and landslide prone area, schooling route and so on. Engineers are responsible for the compliance of these norms, yet in reality schools tend to be constructed at high risk zone as SMC can select the construction site. These are all important factors in deciding the construction site, hence they are converted into variables.

The third sub-component is the safety in non-structural aspects such as monitoring of school facilities. Non-structural safety is important for the physical security of students (De Angelis and Pecce, 2015). This aspect should be evaluated from different perspectives such as availability of norms, budget for maintenance, monitoring mechanism.

5.1.3 Development of non-formal education index

This section describes the process of development and contents of non-formal education index. As literature review as well as the practices shown in Chapter 4, non-formal education activities target either children, teachers or community people. Hence, the non-formal education components are divided into three namely; Education for children, Teachers' training and Education for community. All the components, sub-components and variables are shown in Table 5.2.

Table 5.2 Non-formal education index

Component	Sub-component	Variables
Education for children	Implementation	(1) Program is established based on political commitment/national and state policy
		(2) Introduction of various learning modality adopted (Interactive learning, experiential learning, active learning etc.)
		(3) Contents of program interconnect with the disaster education of school curriculum and school co-curricular activities
		(4) Program component that conduct with the community participation
		(5) Program is conducted with the collaboration of multi-stakeholders
	Manual/material	(1) Educational materials prepared for the program component
		(2) Availability of various types of educational materials for one program in average (poster, audio, visual, books)
		(3) Educational materials prepared in local context
		(4) Educational materials prepared in accordance with program component
		(5) Educational materials is elaborated with the collaboration of multi-stakeholders
	Program evaluation	(1) Indicators/standards for evaluating achievement of program
		(2) Mechanism to ensure sustainability of the effectiveness of program after the program ends
		(3) Mechanism of documentation (report, publication,) of the disaster education practice
		(4) Institutional mechanism of reflecting evaluation and achievement into next program.
		(5) Collaboration of multi-stakeholders in evaluating the program
Teachers' training	Implementation	(1) Availability of teacher's training component among all disaster education related program
		(2) Contents of teacher's training component is interconnected with school education (Curriculum, Co-curricular activities).
		(3) Coordination with education department
		(4) Trainer specialized in disaster management to provide training for teachers
		(5) Multi-stakeholders' collaboration in conducting the training
	Training materials	(1) Educational materials for training program
		(2) Educational materials are prepared in accordance with training program contents
		(3) Manuals for teachers to conduct disaster education at individual schools is provided at training
		(4) Educational materials prepared in local context
		(5) Educational materials is elaborated with the collaboration of multi-stakeholders.
Evaluation	(1) Indicators/standards for evaluating achievement of teacher's training program/component	
	(2) Mechanism of documentation (report, publication,) of the teacher's training	
	(3) Institutional mechanism of reflecting evaluation and achievement into next program.	
	(4) Mechanism to share the achievement of teacher's training with department of education	
	(5) Collaboration with multi-stakeholders in evaluating the teacher's training	
Establishment of community body	(1) Component of establishment of community based organization on disaster management	
	(2) Integration of the governmental guideline on community based disaster management	

		(Village Disaster Management Committee)
		(3) Mechanism to promote the participation of various age-group and gender.
		(4) Mechanism to promote the participation of teachers into community based disaster organization on disaster management
Education		(5) Establishment is conducted with the collaboration of local government
for		(1) Elaboration of community disaster management plan
community		(2) Component of orientation/awareness rising for established community organization
	Training and capacity building	(3) Training component for each task forces of established community body.
		(4) Component/activities to work with local school
		(5) Program is conducted with the collaboration of multi-stakeholders
		(1) Indicators/standards for evaluating achievement of program
		(2) Mechanism to ensure continuity (sustainability) of the effectiveness of program after the program ends
	Evaluation	(3) Mechanism of documentation (report, publication,) of the disaster education practice
		(4) Institutional mechanism of reflecting evaluation and achievement into next program
		(5) Collaboration of multi-stakeholders in evaluating the program

5.1.3.1 Education for children

Education for children implemented by non-formal education sectors is explained in Chapter 4, and UNDP-DMMC project and NSSP are introduced as the example of non-formal education practices. Both programs have component to implement DRR education to students. Sub-components can be implementation of DRR education for children and available manuals/materials. Besides, non-formal education sector generally implements program for limited terms, thus it is project-based. In case of the project, the evaluation is necessary to improve the understanding of project outcomes in the organizations (Meredith and Mantel, 2011). Proper understanding of project outcomes leads to establish improved project in the future as well. Therefore, sub-components are established as; i) Implementation, ii) Manuals/materials, and iii) Program evaluation. The composition at sub-component level remains similar to the sub-components of curriculum in formal education index, its originality is observed at the level of variables.

The first sub-component is implementation. As the feature of non-formal education is to adopt various types of learning modalities such as interactive learning, experienced-based learning and active learning (Chapter 2), degree of using modalities is adopted as a variable. Furthermore, non-formal education supplements the formal education as it is discussed in Chapter 2. Hence, interconnection of program with formal education is added as one of the variables.

From the point of view of manual/material, non-formal education features to use various types of educational materials based on the learners' interest. Actually, posters, movies, illustrative booklets were observed in the practices of non-formal education in Uttarakhand. Besides, availability of manual/material

and consistency of manual/material with program component are set up as variables because some of the components of UNDP-DMMC program as well as NSSP did not provide the materials for learners.

Regarding the evaluation, weakness in documentation and lack of mechanism of ensuring sustainability after program ends were observed in DMMC. These two aspects cannot be excluded from the elements to lead to effective DRR education. In addition, one officer in the state government pointed out that the lack of evaluation mechanism hampers to reflect the outcomes into the next project. These aspects were converted as variables of evaluation.

5.1.3.2 Teachers' training

Teachers' trainings were conducted under UNDP program as well as NSSP, and both trainings were project-based. Sub-components are set up as i) Implementation, ii) Training materials, and iii) Evaluation. Although same component exists in formal education index, features of non-formal education are incorporated.

One different variable in implementation is the interconnection with formal education. As explained in previous subsection, one of the features is that non-formal education can supplement formal education. For example, while teachers' training conducted by formal education sector mainly provides theoretical aspects of DRR, non-formal education sector can add the practical skills to survive from natural disasters. Another difference is the aspect of coordination with education department. All the teachers are employed by education department. Coordinated implementation between non-formal education sector and department of education helps to accumulate the know-how of non-formal education at education department. These kinds of inter-organizational interaction should be considered for better and effective implementation of the training. Thus, these aspects are converted as variables to measure the degree of implementation.

The second sub-component is training material. While sub-components of manual/textbook of teachers' training of formal education index includes the variable related with the promotion of teaching capacity and incorporation of disaster risk management into school management, variables of training materials here focus rather on whether the training materials are prepared in accordance with training program, and if the materials are distributed to teachers to give class on DRR at individual schools. Because the teachers' training by non-formal education sector prioritizes practical outcome of the training, while formal education focuses more on the capacity development of teachers and school management. The variables of evaluation are same as the evaluation of education for children.

5.1.3.3 Education for community

Community members are the first responders in case that natural disasters take place (Shaw, 2014). Hence, the enhanced capacity of community leads to better disaster risk management during emergency and quick disaster recovery. DMMC also actively works for establishing village disaster management committee all over Uttarakhand state and conducts series of training focusing on basic knowledge on disaster risk management, search and rescue, and first aid. Based on these, sub-components are established as i) Establishment of community body, ii) Training and capacity building and iii) Evaluation.

In the process of establishing community body, participation of men as well as women is important to incorporate both opinions. In addition, community body is basically headed by elderly person of the community, however, youth can contribute to mobilize people for rescue operation at community. Thus, variables of establishment of community body measures whether the aspects of gender balance, participation of various age-group people and teachers are considered. Even though the advantage of non-formal education sector is to implement the program out of governmental limitation and restriction, there is disadvantage of non-formal education. Programs mentioned here such as UNDP program and NSSP does not last permanently, and basically local governments take over the activities. Hence, it is also important to take into consideration the governmental guideline on community based disaster risk management group, which allows government to follow up after program ends.

Once the community body is established, members are required to be trained to prepare for and deal with natural disasters. Availability of disaster management plan and training components are converted into variables apart from the available activities of community body with local schools, which is important to strengthen the school-community linkages. The variables of evaluation are the same aspects as the evaluation of previous two sections.

5.1.4 Development of informal education index

This section describes the process of development and contents of informal education index. Informal education is unintentional learning process in daily life. It is explained in Chapter 2 that local knowledge and media are the examples of informal education in DRR context. Besides, the composition of community and family affects the pattern of information transfer. In Chapter 4 it is introduced the observed practices of informal education in Dehradun and Rudraprayag such as disaster experience, local knowledge and interaction among community members. Taking these factors into consideration, components of informal education index is established namely; Media, Community and Family. All the components, sub-components and variables are shown in Table 5.3.

Table 5.3 Informal education index

Component	Sub-component	Variables
Media	Social networking service (WhatsApp, Facebook, LINE)	(1) Frequency of reading news/article about disaster on social network service (WhatsApp, twitter, Facebook etc.)
		(2) Frequency of obtaining the warnings of disaster from social network service (WhatsApp, twitter, Facebook etc.)
		(3) Frequency of obtaining the information on dos and don'ts against natural disaster from social network service (WhatsApp, twitter, Facebook etc.)
		(4) Frequency of sharing the news/articles about disaster on social network service (WhatsApp, twitter, Facebook etc.)
		(5) Frequency of sharing the information on do's and don'ts of natural disaster on social network service (WhatsApp, twitter, Facebook etc.)

Internet Media (internet)	(1) Frequency of watching the weather forecast on internet (Internet news site, Web site of Meteorological Agency).
	(2) Frequency of reading the article on internet about disaster experience of the area you live.
	(3) Frequency of seeing the news on disaster (scale, number of victims, area, damage etc.) on internet (Internet News, Web page of Disaster Management Authority).
	(4) Frequency of obtaining the warnings of disaster from internet (Internet News, Web page of Disaster Management Authority).
	(5) Frequency of obtaining the information on do's and don'ts of natural disaster from internet (Internet News, Web page of Disaster Management Authority).
Mass media (TV, Radio, Newspaper)	(1) Frequency of watching the weather forecast on TV, radio and newspaper?
	(2) Frequency of watching/reading the article on TV, radio and newspaper about disaster experience.
	(3) Frequency of seeing the news on disaster (scale, number of victims, area, damage etc.) from TV, radio and newspaper.
	(4) Frequency of obtaining the warnings of disaster from TV, Radio and Newspaper.
	(5) Frequency of obtaining the information on dos and don'ts of natural disaster from TV, radio and newspaper.
Community linkage	(1) Frequency of village level meeting
	(2) Availability of opportunity to participate in the activities of community (such as clean-up project)
	(3) Availability of opportunity to be involved in the activities of community based group (volunteer group, group for woman empowerment)
	(4) Availability of opportunity to be involved in the religious group activities at your community
	(5) Availability of opportunity to attend the activities of local school? (Independence day event, sports competition, cultural competition)
Community Disaster experience	(1) Flood experiences of community that brought structural damage before
	(2) Earthquake experiences of community that brought structural damage before
	(3) Landslide experiences of community that brought structural damage before
	(4) Drought experiences of community before
	(5) Disaster experiences of community that caused human loss
Local knowledge	(1) There is a saying to predict heavy rainfall at your community
	(2) There is a saying to predict the occurrence of earthquake at your community
	(3) There is a rituals to prevent the occurrence of natural disaster at your community
	(4) There is a storytelling/folklore about the past natural disaster at your community
	(5) There is a traditional way of construction to mitigate the damage of natural disaster at your community

		(1) Frequency of having conversation among family members about the possible occurrence of disaster.
		(2) Frequency of having conversation of how to react during disaster such as dos and don'ts.
	Conversation on disaster	(3) Conversation and preparation of disaster kit for family which contains the items needed to survive during and soon after disasters. Examples of kit contents are followings.
		(4) Conversation and confirmed evacuation route for case of disaster
		(5) Conversation and shared the way to contact among your family member in case that one of family members become separated during disaster.
		(1) Frequency of listening to the earthquake experience of your family members.
		(2) Frequency of listening to the flood experience of your family members.
Family	Sharing of disaster experience	(3) Frequency of listening to the landslide seen or experienced by your family members.
		(4) Frequency of talking to your family members about the disaster experience that your acquaintance had
		(5) Sharing of disaster experiences including do's and don'ts for disaster
		(1) Talking to your family members what you learned at the class of school
		(2) Talking to your family members what you learned about disaster management at class in school
	School learnings into home	(3) Talking to your family members what you learned on first aid and search and rescue through school activities (NCC, NSS, Scout and Guide, other school activities)
		(4) Teaching to your family members what you have learned about first aid and search and rescue at home
		(5) Application of what you have learned at school on disaster management for your home (for some preparedness)

5.1.4.1 Media

Different types of media is used as a means to obtain the information such as social networking services (SNS), internet news, TV, radio and newspapers. Regarding the SNS, it allows users to create list of friends, upload their status and comment each other (Hampton et al., 2011). It means that users can “share ideas, activities, events, and interests within their individual networks” (Dong et al., 2014, p. 708). Therefore, one of characteristics of SNS is the interaction with others through internet site and this should be distinguished from other types of media. On the other hand, internet, TV, radio and newspapers are all categorized as mass media. Because the mass media is defined as “any communication channel used simultaneously reach a large number of people” (Wimmer and Dominick, 2013, p. 2). However, the internet media has different feature from mass media such as the on-demand access to the information at any moment. Therefore, sub-components are elaborated as i) Social Networking Service (WhatsApp, Facebook, LINE), ii) Internet media, and iii) Mass media (TV, Radio, Newspaper).

Variables are elaborated based on frequency and exposure to certain information related to disaster. In case of SNS, frequency of reading article on disasters, obtaining warning, and dos and don'ts are measured. In addition, advantage of SNS is the function of sharing certain information with other people within network. Thus, the aspect is also included. Variables of internet media and mass media ask basically the frequency of obtaining the information based on different categories of information such as weather forecast, disaster experience, disaster related news, warning and do's and don'ts.

5.1.4.2 Community

The form of knowledge sharing among community members depends on the composition of community and strength of community linkage. Takeuchi et al. (2011) indicated that the linkage of community people is one of the factors to promote DRR education at community level. Besides, as state of Uttarakhand has been suffered from number of natural disasters, disaster experiences of community may keep people aware of disasters. Because some literatures examined that high exposure to natural disasters might sustain people's awareness (Knuth et al., 2014; Silver and Andrey, 2014). It is already indicated in Chapter 2 and Chapter 4 that local knowledge is one of the elements of informal education. Based on these, sub-components of community is set up as i) Community linkage, ii) Disaster experience, and iii) Local knowledge. As mentioned, community linkage is one of the elements to encourage the communication of community people and it results to transfer the knowledge among community (Chapter 4). Therefore, variables of community linkages focus on the frequency of village level meeting and opportunities to be involved into different types of community activities. As it is described in Chapter 4, even at Bhagat Singh ward, urban community in Dehradun, there are many opportunities for meeting people through religious and community development activities.

The second sub-component is disaster experience. Whole state of Uttarakhand has been affected by earthquake, flood, landslide and drought. Hence, the variables consists of the experiences of different types of natural disasters, which cause structural damages as well as human loss. The third sub-component is local knowledge. Based on the interviews conducted in Dehradun and Rudraprayag, some knowledge were identified, hence these were converted as variables.

5.1.4.3 Family

DRR related knowledge is transmitted not only among the community members, but also among family members. In the family, there is a channel of knowledge transfer through conversation "i) between the parents, ii) between parents and children, iii) between the senior members and the younger generations" (Takeuchi et al., 2011). While the school visits in Dehradun and Rudraprayag, throughout the interaction with students, it was identified that students talked with parents about their learning and students listened to some disaster related experiences of family members at home. In addition, knowledge obtained at school is transmitted to parents thus the effect of education spreads from school to home (Vaughan et al, 2003). Taking into these facts, the component of family is sub-divided into i) Conversation on disaster, ii) Sharing of disaster experience and iii) School learnings into home.

The variables of each sub-component are developed based on the visits of schools and community. For example, first two sub-components, conversation on disaster and sharing of disaster experience were extracted from the informal conversations with community people in Rudraprayag. They talk about disaster related topic including dos and don'ts at their own home and sometimes talk about disaster experience to their sons and daughters. Informal discussion with students also revealed that the students talk about disaster related topic at their own home. These aspects are converted into variables, asking the frequency of different types of preparedness and sharing of disaster experiences.

The third sub-component is school learning into home. This was also taken from the discussion with students who shared their learning at home. In fact, they talked different types of knowledge. Some knowledge came from the learning through curriculum and some knowledge were related with skills learnt through co-curricular activities such as NCC, NSS and Scout and Guide. Therefore, the variables are for measuring what extent students talk on different types of knowledge at home.

5.2 IDRE-based data collection

5.2.1 Implementation of IDRE data collection

In order to collect the data based on the indexes, the value of each variable is set up with five scale from one to five. In each variable, one is the lowest and five is the highest, hence the value is designed as three is the medium level. However, perception of respondents influences the choice of value. Therefore, in order to avoid subjective response, respondents are asked to answer based on the quantitative and qualitative criteria of variables and one of the example is shown in Figure 5.2. The Figure 5.2 is the first component of formal education. Under the sub-component, there is a variable asking about the political commitment and legal framework and the variables are measured based on the five scale with qualitative and quantitative criteria. This is the methodology of justifying the reliability of the value in this index.

<ul style="list-style-type: none"> ▪ 1. Policy ▪ 1.1 Policy framework 1.1.1 				
Political commitment/legal framework for ensuring the universal education in compulsory education.				
1.	2.	3.	4.	5.
Not available	Weak	Medium	Strong	Very strong
Reason of choice/Reference				
<ul style="list-style-type: none"> ▪ 1. Policy ▪ 1.1 Policy framework 1.1.1-1.1.4 				
Not available: Not mentioned				
Weak: Slightly mentioned in the political commitment, legal framework, state policy				
Medium: Mentioned in the political commitment, legal framework, state policy				
Strong: Stated with main focus in the political commitment, legal framework, state policy				
Very strong: Stated as one of priority within the political commitment, legal framework, state policy				

Figure 5.2 Survey format for policy framework

For all the data collection, face-to-face interviews between interviewer (author) and interviewees is adopted to make a clear explanation of objective and methodology of index. IDRE requires data from various stakeholders involved in formal, non-formal and informal DRR education in both Dehradun district and Rudraprayag. Therefore, corresponding organizations and people were selected for Dehradun as Table 5.4 shows and for Rudraprayag as Table 5.5 shows, and the results were compared between urban and rural context.

Table 5.4 Interviewed organizations and people in urban context, Dehradun

<Formal education>

Component	Date	Respondent Designation
Policy	Sep 18, 2015	District project officer, District Education Office
Curriculum	Sep 15, 2015	Senior lecturer, DIET Dehradun
Co-curricular activities	Sep 17, 2015	Engineer, (in-charge of inclusive education) District Education Office
Teacher's training	Sep 15, 2015	Senior lecturer, DIET Dehradun
School buildings/facilities	Sep 17, 2015	Engineer, (in-charge of inclusive education) District Education Office

<Non-formal education>

Component	Date	Respondent Designation
Education for School Children	Sep 14, 2015	District Disaster Management Officer, Dehradun
Teacher's training	Sep 16, 2015	Officer, UNDP-DMMC program
Education for Community	Sep 14, 2015	District Disaster Management Officer, Dehradun

<Informal education>

Component	Date	Respondent Designation
Media	Sep 19, 2015	40 students of class 10, Mangla Devi Intercollege
Family	Sep 19, 2015	40 students of class 10, Mangla Devi Intercollege
Community	Sep 19, 2015	Ward leader of Bhagat Singh Colony, one school principal and one community member

5.2.3 Data processing

Each sub-component has five variables and each variable consists of five scale of minimum one and maximum five. The selected answer of each variable is summed up and the average of each sub-component is calculated. Hence maximum rate of each sub-component is five and minimum rate is one. In case of informal education index, 40 students answer sub-components of media and family, and each student responds to the paper-based survey format. Then the average of 40 students in each variable is calculated. After calculating all the score in sub-components of formal, non-formal and informal education index, they are all converted into radar charts. The results are shown in following sections.

Table 5.5 Interviewed organizations and people in rural context, Rudraprayag

<Formal education>		
Component	Date	Respondent Designation
Policy	Sep 7, 2015	District Education Officer (Secondary Education), District Education Office
Curriculum	Sep 7, 2015	District Education Officer (Secondary Education), District Education Office
Co-curricular activities	Sep 7, 2015	District Education Officer (Secondary Education), District Education Office District Program Coordinator (NSSP)
Teacher's training	Sep 8, 2015	Principal DIET Rudraprayag, Lecturer DIET Rudraprayag
School buildings/facilities	Sep 10, 2015	Engineer, District Education Office Rudraprayag
<Non-formal education>		
Component	Date	Respondent Designation
Education for School Children	Sep 7, 2015	District Program Coordinator (NSSP)
Teacher's training	Sep 7, 2015	District Program Coordinator (NSSP)
Education for Community	Sep 10, 2015	District Disaster Management Officer, Rudraprayag
<Informal education>		
Component	Date	Respondent Designation
Media	Sep 9, 2015	40 students of class 10 Kyunja intercollege
Family	Sep 9, 2015	40 students of class 10 Kyunja intercollege
Community	Sep 9, 2015	Gram Pradhan of Bhanaj, and one board member

5.2.4 Result and interpretation of formal education index

5.2.4.1 Result and interpretation of formal education index in Dehradun

The result is shown in Figure 5.3. Policy, curriculum, co-curricular activities, teachers' training and school buildings respectively scored 1.9, 4.4, 3.6, 3.4, and 2.0. Therefore, policy and school buildings had below the middle score and other three components, curriculum, co-curricular activities, and teachers' training obtained higher than the middle.

Policy component got lowest score among five components. Each sub-component, application of policy framework, level of policy implication and evaluation of policy implementation obtained low scores as well respectively 1.6, 2.2 and 2.0. This is due to the lack of policy to promote the DRR education. Policy includes the series of actions to solve social issues and it accompanies the financial as well as technical support from government. Hence, low score in policy implies the weakness in financial support as well as technical support at the same time. Even though there was no policy to promote DRR education, SSA/RMSA contributed to score each sub-component, as indexes included the aspect to measure universal education.

Second component was curriculum and it obtained 4.4 which was highest among five components. In spite of the lack of DRR education promotion through policy, sub-component of curriculum had 4.2 score, textbook had 4.6 score and evaluation had 4.4 score. These higher scores were taken because DRR related contents were infused into various subjects and this results corresponds to the results shown in Chapter 4. Therefore, curriculum infusion was accomplished without policy support. In addition, one third of Social Science class was allocated for chapter of Disaster Management with localized contents, and textbook was elaborated by DMMC, which was an example of inter-organizational collaboration. In terms of evaluation, evaluation mechanism of curriculum was established by DIET Dehradun and feedback was made from teachers, BRC, CRC, and state department of education. Thus, these situations were reflected to the score of index.

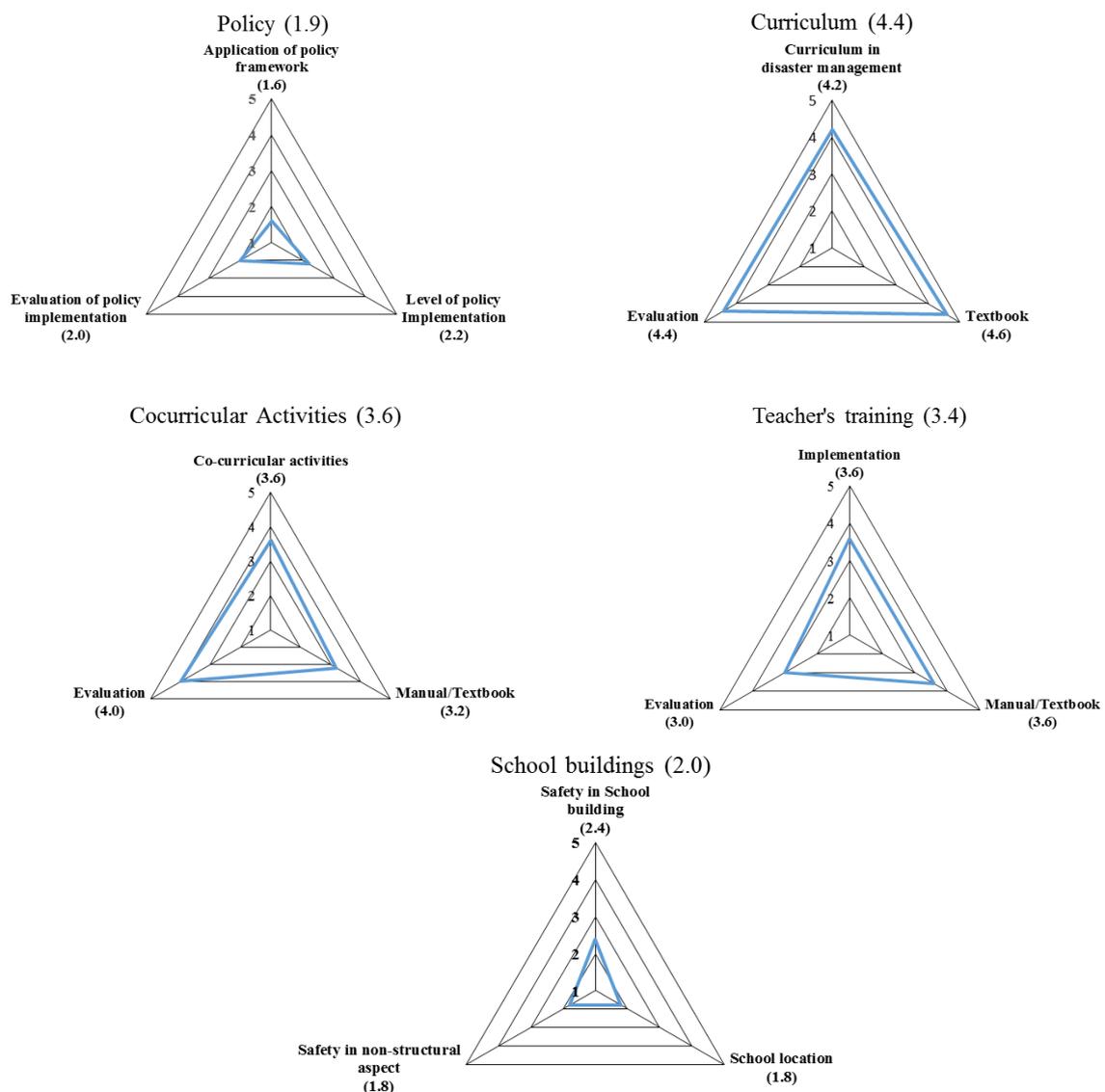


Figure 5.3 Result of formal education index in Dehradun

First sub-component of co-curricular activities obtained the score of 3.6. As activities such as NCC, NSS and Scout and Guide are national schemes, the educational materials are not sufficiently localized, which is

the factor to lower the score while frequent implementation of co-curricular activities is observed from the results. Interviews held at SCERT (Chapter 4) showed that some teachers are assigned in-charge of co-curricular activities in each school. Hence it implies that frequent implementation of co-curricular activities depends on the motivation of teachers. Regarding the manual/textbook, it scored 3.2. The score showed around middle, however the result of variables indicated that schools have their own manual/textbook to implement the activities. Third sub-component evaluation had the score of 4.0. This relatively higher score was obtained because the evaluation was implemented periodically for both contents as well as manual/textbook.

Teachers' training shows slightly higher than the middle score as it obtained 3.4. Sub-component of implementation scored 3.6. The factor to push up the score was that the officers of DIET received specialized training by DMMC and DM cell, and the training was implemented with the cooperation of DMMC and DM cell. These are the factors to push up the score. On the other hand, the factor to push down the score was the frequency of teachers' training. It was held once a year, therefore it required certain time to equip all the teachers with awareness and knowledge on DRR at school. Sub-component of manual/textbook scored 3.6 as well. Strength in manual/textbook was that the teaching materials were elaborated by DIET Dehradun with the support of DMMC and DM cell. The manual focus on basic knowledge on disaster management, natural disasters, human induced disasters and communication in emergency. As it did not contain concretely about school structural safety, it was regarded as weakness by respondent of the survey. Evaluation is the last sub-component and it obtained 3.0. DIET Dehradun has introduced the evaluation system that 25 academic staff of Dehradun visit five schools each and evaluate the outcome of the teachers' training, then the evaluation is fed back to DIET Dehradun. However, the evaluation is qualitative and no goals of training is set up, which is the factor to pull down the score in evaluation. It should be noted that characteristics in co-curricular activities as well as teachers' training were to utilize the resources and stakeholders out of department of education. Hence, district education office takes advantage of urban area.

Safety of school buildings are indispensable for students' safety from natural disasters, however, the component of school buildings obtained 2.0. All three sub-components as well had low scores, safety in school building was 2.4, school location was 1.8 and safety in non-structural aspect was 1.8. In the sub-component of safety in school buildings, there was a specific design with all safety norms, however, engineer of education department was not asked to neither conduct periodical structural check nor give training to SMC, which committee was given the role of school management including facilities. These lack of checking mechanism contributed to the low score. In terms of school location, it shows 1.8 due to the mechanism that school construction site is donated by local community, which tends to be constructed at high risk zone. Regarding the non-structural safety, which obtained 1.8 as well, no norms and instruction were made for schools while certain amount of budget was allocated for maintenance.

As a result of the formal education index in Dehradun, even though the policy to promote DRR education was not established, DRR contents are infused into curriculum, co-curricular activities with DRR contents

such as NSS, NCC and Scout and Guide are implemented and teachers' training infused DRR contents. These are all achieved through the cooperation with different stakeholders. Besides, the results also pointed out that teachers' motivation towards co-curricular activities link with the frequent implementation. In terms of the school building, there is no provision from district department of education to ensure the structural and non-structural safety after the construction.

5.2.4.2 Result and interpretation of formal education index in Rudraprayag

The result is shown in Figure 5.4. Policy, curriculum, co-curricular activities, teachers' training and school buildings scored respectively 4.2, 3.3, 2.3, 1.9 and 2.9. Highest score among five components was obtained by policy and the lowest was teachers' training. As middle score is 3.0, co-curricular activities and school buildings were lower than the middle, respectively 2.3 and 2.9.

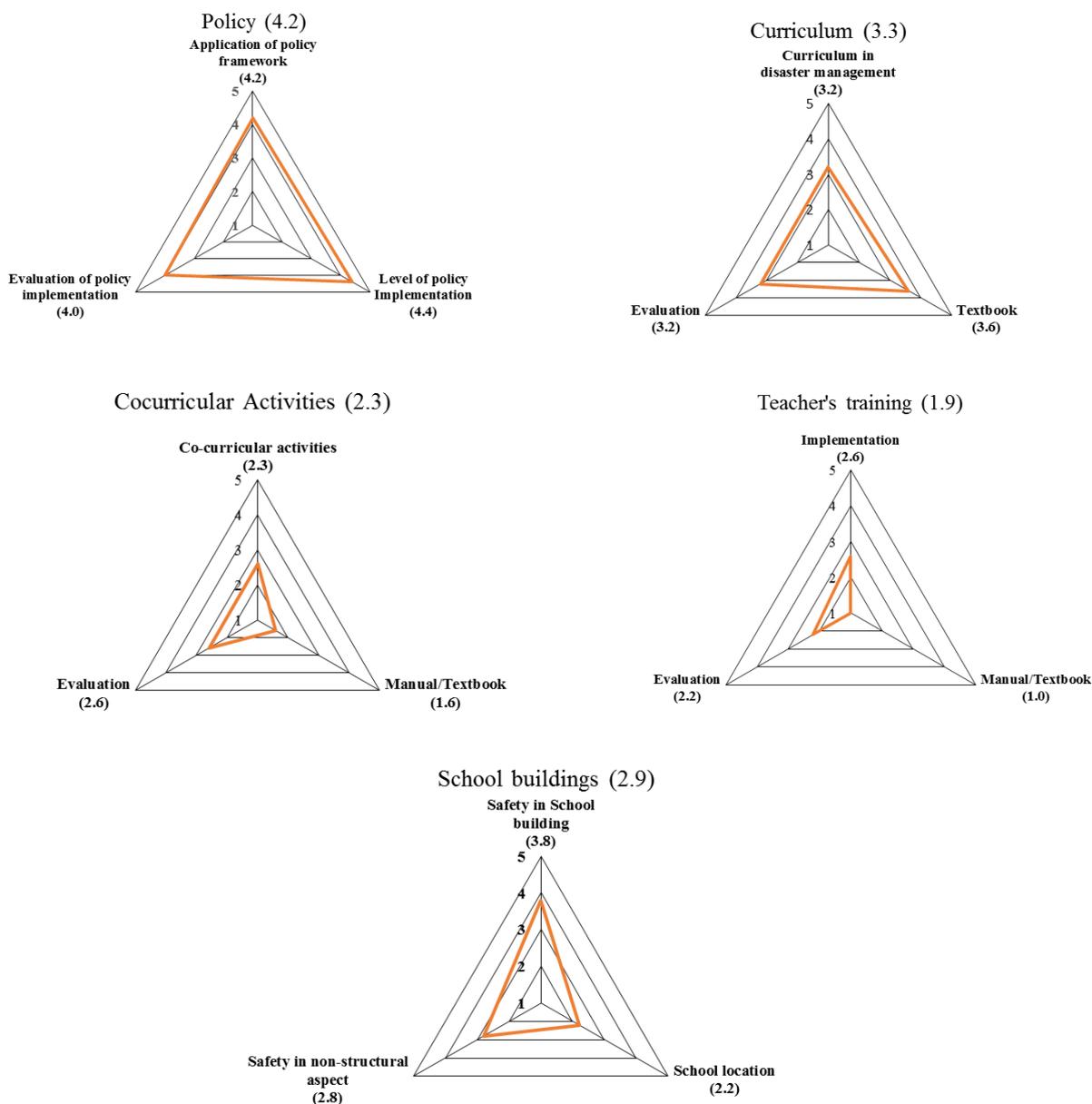


Figure 5.4 Result of formal education index in Rudraprayag

All sub-components of policy scored above 4.0. Main factor of the score is that NSSP is conducted according to the national government approval in the district. Fund is allocated for the implementation, coordinator for implementing program is employed, and the committee for implementing NSSP is established. These are all factors to contribute to the high score in policy. In terms of evaluation of policy implementation, there is a mechanism of periodical assessment and review by superior organizations, which are the factor to push up the rate of evaluation aspect.

Sub-component of curriculum got scores of 3.2, 3.6 and 3.2 respectively for curriculum in disaster management, textbook and evaluation. Regarding the sub-component on curriculum, DRR related contents are incorporated into curriculum and especially the class of Social Science has independent chapter on disaster management, as in Dehradun. Even though the contents of DRR as well as textbook were elaborated by DMMC, the result of survey indicated that the localization of contents has not sufficiently been considered for mountainous region. This is one of the factors to lower the score in both curriculum as well as textbook. In addition, the sub-component of evaluation scored 3.2 because there was a mechanism of collecting the opinions from teachers throughout workshop for head teachers and teachers, which is organized by district education office. However, the result showed that the collected opinion is not reflected to the future education.

Co-curricular activities was the third component. Sub-component scored 2.6, 1.6 and 2.6 respectively for co-curricular activities, manual/textbook and evaluation. The result of survey indicated that NSSP is a major co-curricular activities relevant to DRR in Rudraprayag as it covers 200 schools. Although the NSSP covers 200 schools with different types of activities, sub-component of implementation is 2.3 and it does not show high rate in implementation. This is because the guideline for NSSP is prepared in general context and not specific for mountainous area. Besides, there is a committee for coordinating NSSP, however implementation of program at school levels is held by DDMA, and organization such as superintendent police and fire department are not involved due to lack of fund. In terms of the manual/textbook, there is no distributing materials prepared for implementing DRR education for students. In addition to all, even though NSSP covers 200 schools, activities at school level is only once a year. The low frequency in implementation is reflected to index as well. NSSP is a national government scheme and implemented in Rudraprayag district, however the results do not show high score in co-curricular activities. This simply implies that the effect of NSSP does not reach to the students due to low frequency of activities, lack in manual/textbook and limitation of collaboration of multi-stakeholders.

Implementation of teachers' training scored 2.6, manual/textbook scored 1.0 and evaluation scored 2.2. DIET Rudraprayag provides teachers training for 200 – 300 teachers per year among approximately 1,800 teachers working at schools in Rudraprayag district, hence the system of teachers' training function well. In addition, during the NSSP, two trainers of training from DIET Rudraprayag had training on DRR. On the other hand, there is no training on DRR.

The sub-component of school buildings obtained following scores, 3.8 for safety in school building, 2.2 for school location and 2.8 for safety in non-structural aspect. The safety in school building is relatively higher than other two sub-components. Basic design for school building with all safety norms is available and engineers are deployed at district education office. Engineers visit periodically during the construction. Besides, SMC is in charge of school management as well as fund management during the construction. Hence, training on construction guideline and financial training were given to the SMC. Therefore, these are the factors to increase the scores. However, once the construction ends, the school becomes a property of community and all the structural issues are supposed to be monitored by individual school according to the engineer in Rudraprayag. Hence, there is no institutional mechanism for periodical structural check of school building, which decrease the score of safety in school building.

Regarding the school location, SSA program set up the guideline on the maximum schooling distance; 1km for primary school, 3km for upper primary school, 5km for higher secondary school and 7km for intercollege. These norms are followed and escort facility is available, which is the system that adult accompanies students in case school route includes dense forest or some risky area. These aspects contributed to push up the score of school location, while the limitation of level land allows to construct schools at high risk zones, which pull down the scores in index. Furthermore, the land for construction is provided by community and no geological and geographical survey are held before the construction. In terms of the safety in non-structural aspects, some basic safety measures are applied such as fixing the blackboard and 12,000 rupees are allocated to every schools for maintenance of non-structural aspect. On the other hand, there is no mechanism of monitoring the school facilities in terms of safety.

As a result of the formal education index in Rudraprayag, policy aspect is highlighted due to the application of NSSP, however, it is not reflected to the co-curricular activities due to low frequency of activities, lack of manual and textbook and limitation of collaboration of multi-stakeholders. NSSP program has committee with multi-stakeholders including education department, police department and fire department, hence the utilization of those stakeholders leads to the more frequent implementation of co-curricular activities. Besides, it should be noted that the teachers' training held by DIET Rudraprayag does not include the training on DRR. In terms of the school building, SMC is responsible for the school building after the construction. As district department of education gives training to SMC, SMC is the key to ensure the safety of school and this fact is applicable for Dehradun as well.

5.2.4.3 Comparative result and interpretation of formal education

The comparative result of both Dehradun and Rudraprayag is shown in Figure 5.5.

The results of the Dehradun in policy aspects showed that lack of policy to promote DRR education and it leads to the weakness in financial and technical support for DRR education. On the other hand, NSSP, government approved program, is implemented with the budget allocation and implementation scheme. Therefore, this difference is shown in the index.

In terms of the curriculum, there is no difference in curriculum contents in Dehradun and Rudraprayag, one of the reason why the difference is produced is the perception to the localization. The result of the index in Dehradun indicates that the contents of disaster management in Social Science is localized, while the results in Rudraprayag indicates that it is not localized sufficiently.

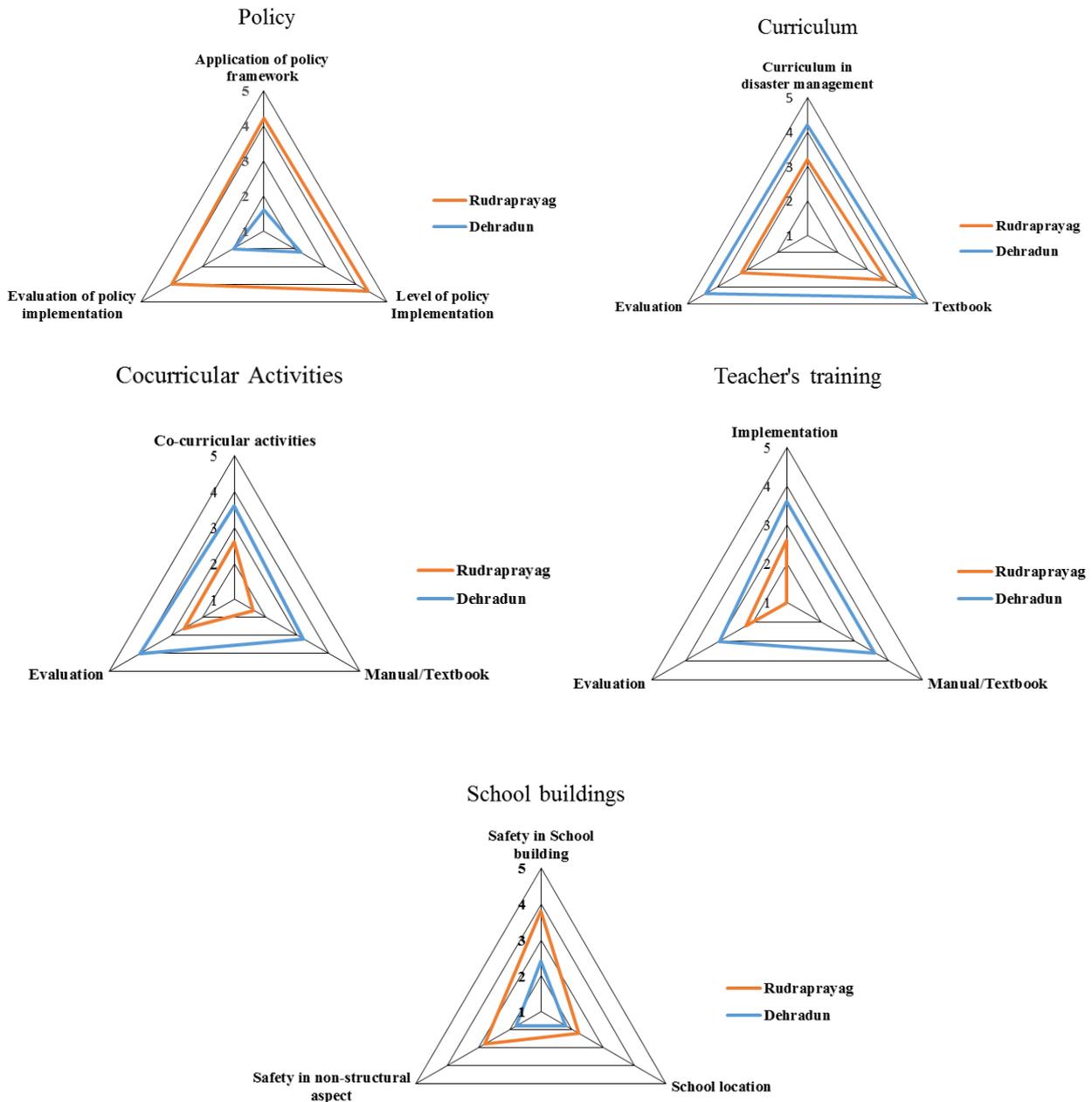


Figure 5.5 Comparative result of formal education index

In terms of co-curricular activities, although Rudraprayag is selected as program site of NSSP, the component of co-curricular activities is still lower than that of Dehradun district. As discussed earlier, co-curricular activities depends on the motivation of teachers and degree of the cooperation of different stakeholders and these aspects produced the differences between two districts.

In terms of teachers' training, contrast is also observed between Dehradun and Rudraprayag. The gap is produced simply because DIET Dehradun implement DRR education for teachers, while DIET Rudraprayag does not. Besides, major gap between two was about manual/textbook, as manual/textbook of Dehradun is 2.6 scores higher than that of Rudraprayag. This is because DIET Dehradun has elaborated manual with the support of DMMC and DM cell, while Rudraprayag does not have any material for training.

In terms of the school buildings, all three sub-components of Rudraprayag obtained higher scores than that of Dehradun district. For example in the sub-component of safety in school buildings, Rudraprayag provides the training for SMC while Dehradun does not have such trainings. The difference is also observed in the sub-component of school location. As mentioned, Rudraprayag adopted escort system to ensure the students safety on the school route. In urban area, students commute to schools with various means such as public transportation and by foot, while in rural area every students come to schools by foot. Even though there is a risk in commuting in urban area as well such as traffic accident, varied means of commuting makes escort system difficult to introduce. However, both district does not have mechanism of checking structural and non-structural safety of schools.

As a comparative result, the gap in policy is produced due to the fund and implementation scheme of NSSP, however, Dehradun shows higher in the aspect of co-curricular activities than that of Rudraprayag. It implies that the policy is not a strong factor of implementation of DRR education, rather motivation of teachers and collaboration with different stakeholders are the key to promote the incorporation of DRR contents into co-curricular activities. In terms of curriculum, degree of localization is different between Dehradun and Rudraprayag. Curriculum teaches basically the generalized knowledge hence the important point here is that the teachers have to have the knowledge on DRR to customize the contents of curriculum in teaching at class. Lastly, both district does not have the mechanism of periodical structural check.

5.2.4.4 Positive factors and challenges in formal education

Based on the results of formal education, following aspects are the positive factors in formal education.

Dehradun context

- Even though the lack in policy to promote DRR education, collaboration and cooperation with various stakeholders leads to the implementation of DRR education in curriculum, co-curricular activities, and teachers training
- Teachers' motivation is important for frequent implementation of co-curricular activities

Rudraprayag context

- Utilization of different stakeholders leads to the implementation of co-curricular activities

Common

- Policy is not a strong factor of implementing DRR related co-curricular activities. Rather the motivation of teachers and cooperation with stakeholders are influential to the implementation
- Providing knowledge to teachers leads to customize the generalized contents of curriculum on DRR in teaching at school.

- SMC is the key to ensure the school structural and non-structural safety and incorporate DRM into school management

According to the IDRE survey, challenges are identified as follows,

Dehradun context

- The knowledge about structural safety is not included in the teachers' training
- No training for SMC

Rudraprayag context

- Low frequency of program of NSSP as co-curricular activities
- Lack in manual/textbook for co-curricular activities

Common

- There is no mechanism of checking structural and non-structural safety of school building

5.2.5 Result and interpretation of non-formal education index

5.2.5.1 Result and interpretation of non-formal education index in Dehradun

The result of non-formal education index in Dehradun is shown in Figure 5.6. Education for children, teachers' training and education for community respectively obtained 1.9, 2.7 and 3.1. Education for children shows lowest score among three components and other two components obtained around middle.

The sub-components of education for children scored 1.2 for implementation, 3.2 for manual/material and 1.2 for program evaluation. Regarding the results of implementation and program evaluation, it suggests that no educational activity for children is conducted by DDMA Dehradun. However, the results of IDRE in formal education showed that curriculum as well as co-curricular activities were held, and in fact, formal education supplements non-formal education in this context. The feature is shown in the score of manual/material (3.2). According to the results, different types of materials such as illustrative booklets with local languages and movies to sensitize people in disasters were developed.

Implementation of teachers' training, educational materials, evaluation respectively scored 3.2, 1.0 and 3.8. The teachers training was held under the project of UNDP-DMMC, and it was coordinated accordingly with DIET, and training of trainers were fostered during the project. In fact, UNDP-DMMC project has finished in the year of 2012 and DIET Dehradun has started to develop teaching materials on DRR with collaboration of DMMC and DM cell. Hence, the weakness in educational materials can be covered by formal education. This fact implied that project of UNDP-DMMC contributed to sensitize DIET Dehradun and let DIET Dehradun take initiative to institutionalize teachers' training in DRR. This is one of the example of integrating non-formal education into formal education through the external support. In the process of institutionalization, established communication and awareness of the staff of DIET were considered important in addition that DIET was given the authority to plan new training within the organization. In terms of educational materials, no materials are prepared for teacher's training under the UNDP-DMMC project, hence it scored minimum. In terms of evaluation, only the project report of UNDP is published and there are few records left for other teacher's training.

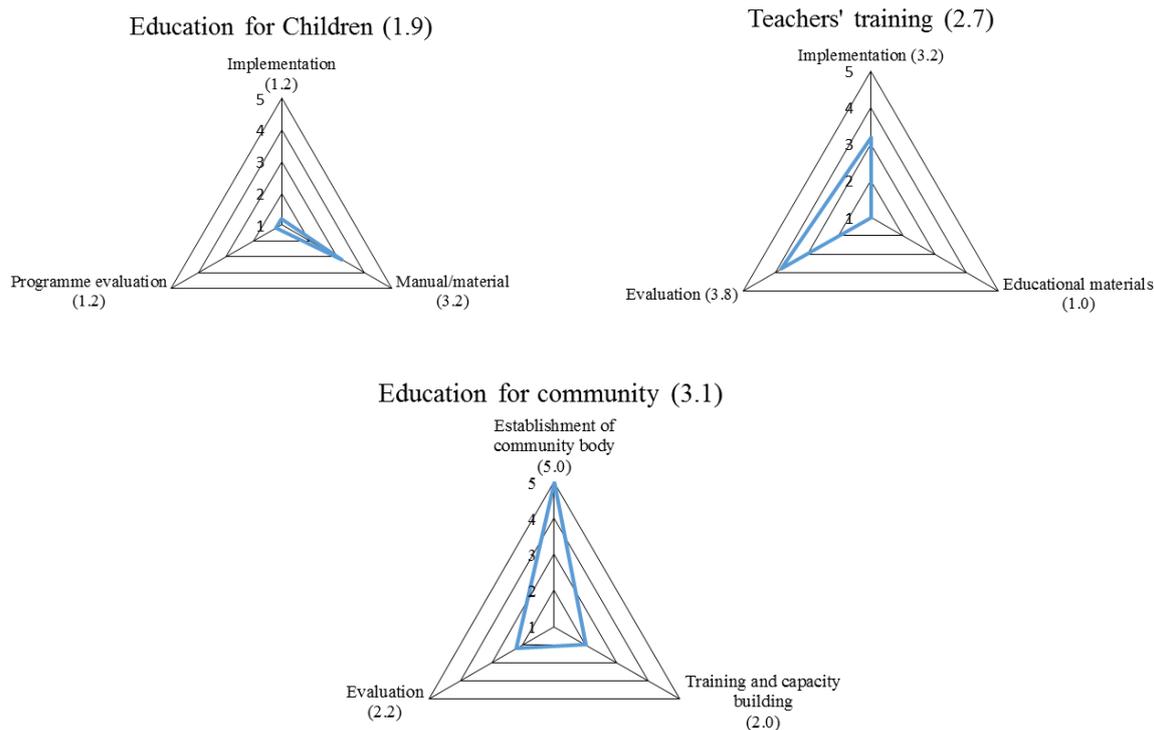


Figure 5.6 Result of non-formal education index in Dehradun

The third component is education for community. Establishment of community body, training and capacity building, and evaluation scored 5.0, 2.0 and 2.2 respectively. Establishment of community body obtained the maximum score because the effort has been made to establish the community based body to deal with disaster management under UNDP program and all the community has village disaster management committee with the participation of elderly and youth. While there are established community body, training and capacity building is 2.0 and it indicates that training is not given sufficiently to the established community body. Only the elaboration of disaster management plan at community is conducted and no follow-up capacity buildings are accompanied. Therefore, it resulted to score 2.0. Even if the community body is available, it going to be difficult to respond effectively during disasters without training. Hence, working on capacity building is important.

In summary, the non-formal education actors in Dehradun developed illustrative booklets with local languages and movies. Through the example that the teachers' training is institutionalized in DIET Dehradun indicates that the established communication between DIET and DMMC, and fostering trainers on DRR in DIET was the key. In terms of the education for community, even though the community body is established, the training is not given to the community body.

5.2.5.2 Result and interpretation of non-formal education index in Rudraprayag

The result of non-formal education index in Rudraprayag is shown in Figure 5.7. Education for children, teachers' training and education for community respectively scored 2.8, 3.4 and 3.5.

In terms of Education for children, implementation, educational materials and evaluation respectively scored 2.6, 3.4 and 2.4. Respondent of the survey considered that NSSP was a major component of non-formal education in Rudraprayag even though the index of co-curricular activities of formal education in Rudraprayag also regarded the NSSP as a co-curricular activities. Therefore, they were overlapped each other. However, variables were different between education for children and co-curricular activities. In terms of implementation aspect, DRR education is given utilizing workshop and experience based learning. These learning modalities are the characteristics of non-formal education and contribute to give score to index, however, the frequency in implementation is only once in a year at each school and program does not ask for the participation of the community in implementing evacuation drill. Therefore, it resulted in scoring 2.6.

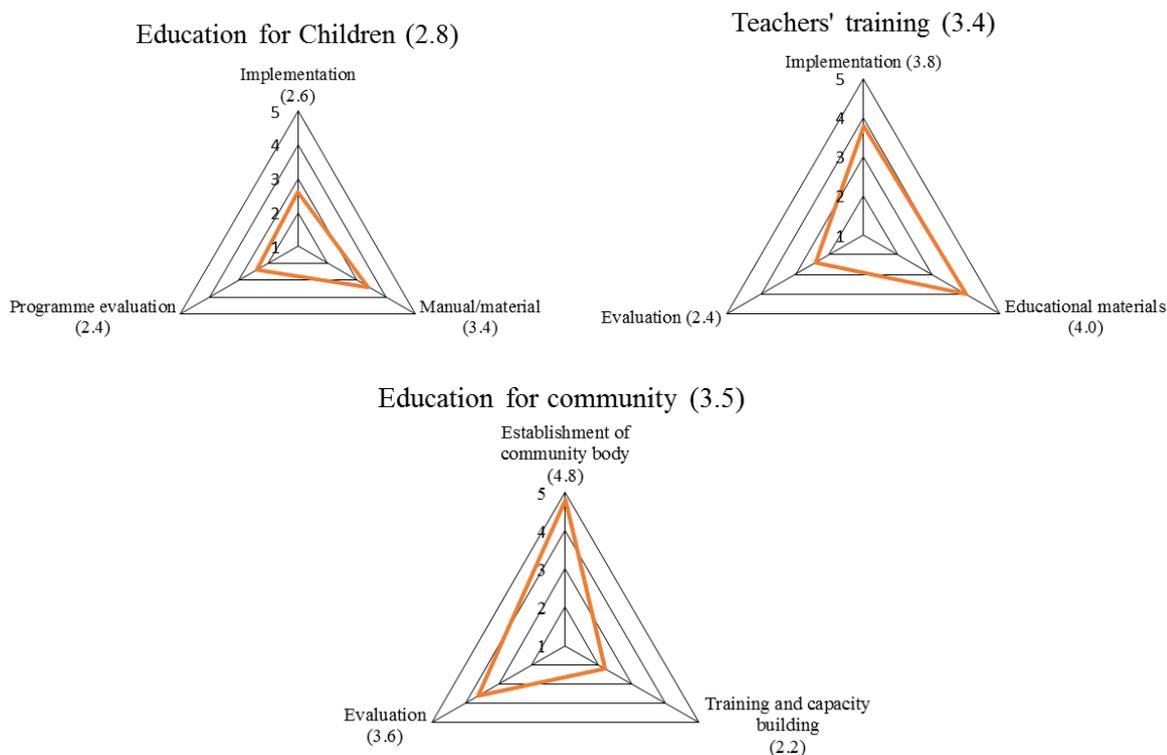


Figure 5.7 Result of non-formal education index in Rudraprayag

In terms of the educational materials, movies, illustrative booklets in local languages are utilized and distributed to schools under NSSP. Regarding the sub-component of Evaluation, it obtained 2.4. It has weakness because there is no follow up scheme for each school to continue to the DRR education.

Teachers' training in non-formal context is given in NSSP scheme. Implementation, educational materials and evaluation scored respectively 3.8, 4.0, and 2.4. In terms of implementation, 450 teachers are covered, and five master trainers and 15 trainers are fostered from DDMA, district education office and DIET. In order to disseminate the effect of training, cascade model was adopted. Fostered master trainers and 15 trainers gave training to the trainers at cluster level and the cluster level trainers replicate the training for teachers from individual schools. These are the factors of pushing up the score in implementation.

However, training is provided only once and no follow up mechanism exists. Regarding the materials, with the budget of NSSP, USB with full of educational materials are given to teachers. The USB contained the manuals and explanation on evacuation drill, risk analysis at school and structural risk. Besides it had some videos on earthquake. Therefore, the teachers' training is given utilizing these materials. Different types of manuals with some visual materials were the factors to give 4.0 score for this sub-component. However, in terms of the evaluation, the training only documented the name of participants. Besides, no mechanism of improvement is included. These are the reason why the sub-component of Evaluation is rated low (2.4).

The third component is Education for community. Establishment of community body, training and capacity building and evaluation respectively obtained 4.8, 2.2 and 3.6. In the aspect of establishment of community body, all the community has village disaster management committee and plan is elaborated at 350 villages through one day orientation. Member of committee includes people above 40 years old, youth, Gram Pradhan and teacher. Therefore, establishment of community body obtained 4.8 score. On the other hand, training and capacity building includes first aid, knowledge on pre, during and past disasters, and tools for search and rescue are given to the committee. Weak points are that the committee is divided into task force, however, no specific training for each task force is held and no activities has been held with the participation of local school. This lead to the lowest score of 2.2 among all sub-components of non-formal education in Rudraprayag. Evaluation is conducted on an annual basis and report submitted to DM, Gram Pradhan and revenue inspectors. Thus the evaluation is held periodically and involved different stakeholders hence the score goes above the middle.

In summary, for both education for children and teachers' training under NSSP, there is no follow-up scheme. Therefore, the teachers' training is given once and drills at each school is also given once. After the process, each school are asked to continue the by their own effort. Some organizational support from department of education or DDMA as specialized organization in DRR are required for the sustainability of the project effect. In addition, the educational effect at school can be disseminated towards community if local residents are given the opportunity ty to participate in the mock drills at schools, which is not included into the component of NSSP. Besides, community body is established in Rudraprayag district, however, the training for them is not carried out especially for task forces of committee.

5.2.5.3 Comparative result and interpretation of non-formal education index

Comparative result of Dehradun and Rudraprayag is shown in Figure 5.8. The results suggest different tendency between Dehradun and Rudraprayag.

There are many gaps between Dehradun and Rudraprayag in the index of education for children, teachers' training and education for community. Common points in three components are that they reflects the available project component of UNDP-DMMC and NSSP, and government provision. For example, even though there is no education for children in Dehradun, the scores reflected in the component of education for children comes from NSSP. In the component of teachers' training, as UNDP-DMMC project did not have component of developing teachers' training materials, the score of educational materials is minimum. In case of NSSP, it has the component of both implementation of teachers' training and development of

educational materials, these aspects are reflected. Even in the component of education for community, both Dehradun and Rudraprayag has higher scores. Establishment of community body is promoted under government provision. Therefore, it implies that organizational responsibilities and government provision is the driving force to promote DRR education in non-formal context.

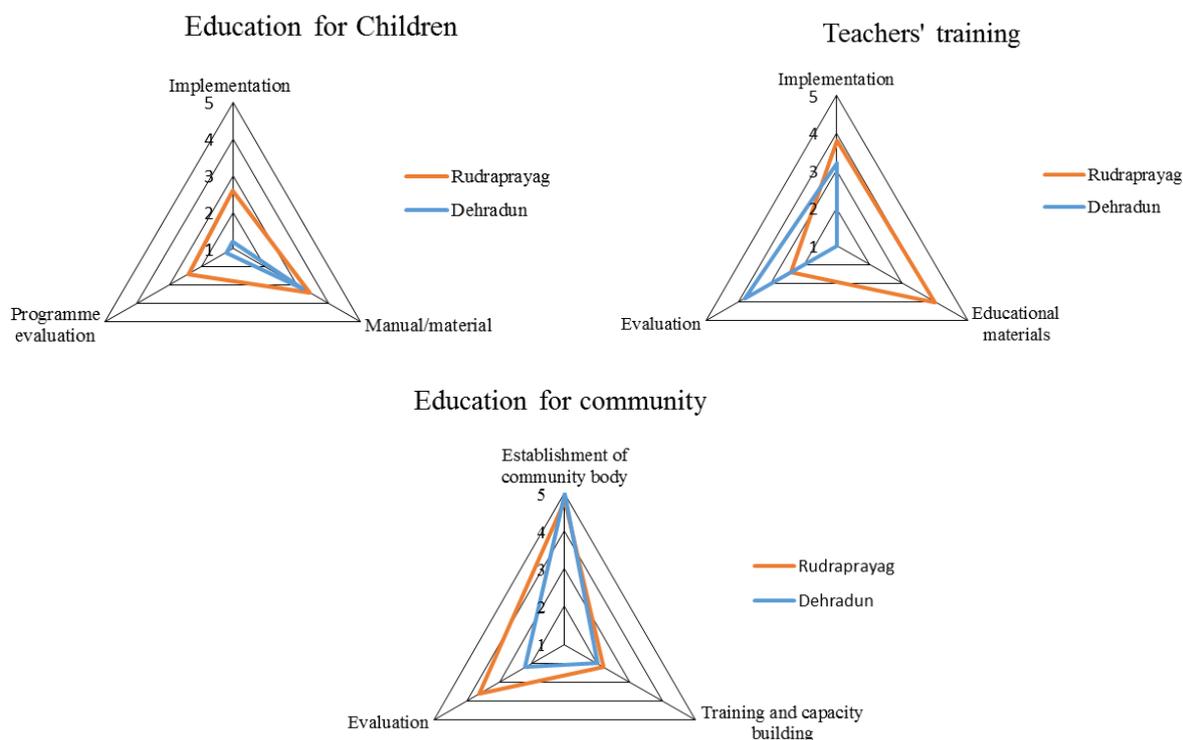


Figure 5.8 Comparative result of non-formal education index

5.2.5.4 Positive factors and challenges in non-formal education

Based on the results of IDRE, following aspects are the positive factors in non-formal education.

Dehradun context

- Illustrative booklets with local languages and movies were developed, which attract learners.
- Fostering trainers of training on DRR in DIET and established communication with DMMC was the key to institutionalize DRR training into teachers' training

Common context

- Community body is established

According to the IDRE, challenges are identified as follows,

Rudraprayag context

- There is no follow-up scheme after teachers' training and mock drills of NSSP
- Community participation to program of NSSP is not promoted

Common

- Training and capacity building for community body is not held

5.2.6 Result and interpretation of informal education index

5.2.6.1 Result and interpretation of informal education index in Dehradun

The result of informal education index in Dehradun is shown in Figure 5.9. Media, family and community respectively scored 3.3, 3.2 and 2.3.

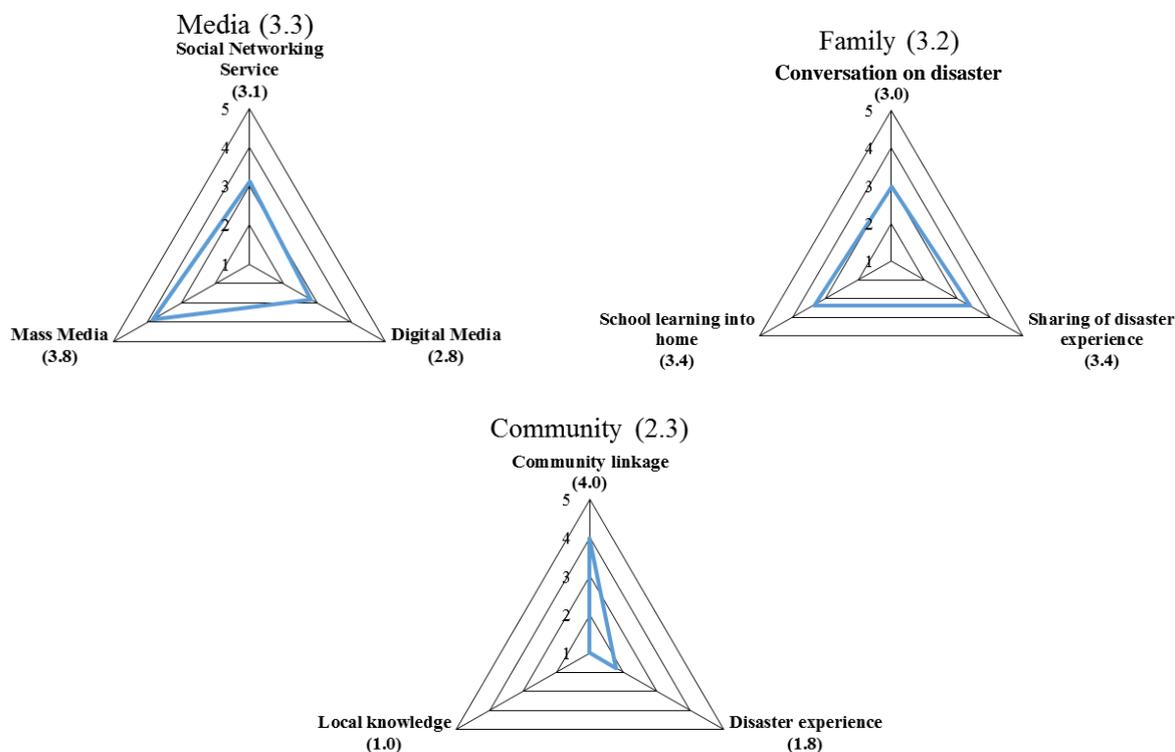


Figure 5.9 Result of informal education index

The sub-component scored 3.3 for social networking service (SNS), 2.8 for internet media, and 3.8 for mass media. The result of the survey showed the different tendency depending on the contents of information. In fact, students tends to obtain the warning on disasters through SNS as it can provide timely information, however the result showed low late in obtaining the information on do's and don'ts through SNS. The other tendency is observed in the result of mass media. Students obtain the information on weather forecast and expose to the news on disasters through mass media.

Regarding the family component, conversation on disaster, sharing of disaster experience and school learning shows around middle score respectively 3.0, 3.4 and 3.4. In terms of the conversation on disaster, students have heard more on how to react during disasters such as do's and don'ts compared with other disaster related conversation. The result also indicated that students talk less frequently about the preparedness among family compared with other disaster related conversation. Regarding the result of sharing of disaster experience, experience of landslide is less frequently talked, and the most shared experiences is about flood. This is because the surveyed community is located at plain area of Dehradun and was affected by flood disasters. Last sub-component is the school learning into home. The result indicated the tendency that students talked about their learning including disaster related topics, while they

rarely share their learning through NCC, NSS and Scout and Guide. Hence, school is one important channel of disseminating DRR knowledge to household level.

Third sub-component is community. This sub-component was measured through community linkage, disaster experience and local knowledge. Community linkage obtained 4.0 while disaster experience and local knowledge respectively obtained 1.8 and 1.0. Even though the surveyed community is spread along with the river and it flooded in 2014 due to heavy rainfall, it rarely experiences natural disasters and local knowledge on DRR is not observed. On the other hand, activities of religious group (Muslims and Hindus) and intervention of NGO are very active, many community meeting are held and it helps to increase the score of community linkage. This implies that knowledge can be transferred through the community compared with the area which has low interaction among community members.

In summary, in terms of media, students obtain the warning through SNS and weather forecast through mass media. Thus, students chose appropriate media for obtaining the information. Even in the family's students tend to share their learning of schools with family members. In addition, do's and don'ts are tended to be talked among family members. Regarding the community, activities of religious group and NGOs create opportunities of interaction among community members.

5.2.6.2 Result and interpretation of informal education index in Rudraprayag

The result of informal education index in Rudraprayag is shown in Figure 5.10.

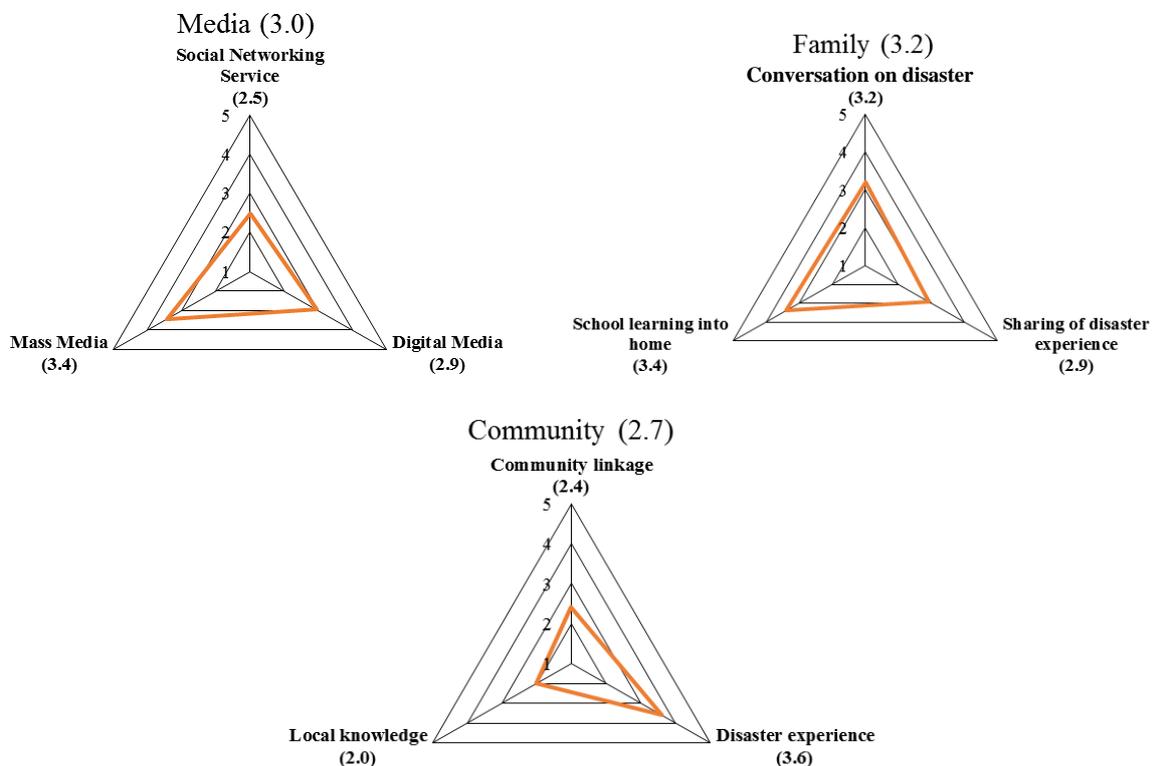


Figure 5.10 Result of informal education index

Media, family and community scored respectively 3.0, 3.2 and 2.7. In terms of media, social networking service (SNS) scored 2.5, internet media scored 2.9 and mass media scored 3.4. Among variables of SNS, obtaining information on early warning was lowest among the others. Internet media didn't show any tendency as all the variables were around middle. However, it is identified that students in Rudraprayag obtain the early warning through the mass media.

Second component is family and each variable of conversation on disaster, sharing of disaster experience and school learning into home scored respectively 3.2, 2.9 and 3.4. In the conversation on disaster, students tend to have conversation about the possible occurrence of disaster and how to react during disasters such as do's and don'ts. However, disaster planning among family members such as deciding evacuation route and prepare emergency kit showed low score in the variables. Therefore, score showed around middle. Rudraprayag is disaster-prone area especially flood and landslide, however, the score of sharing of disaster experience is less than middle. In terms of the learning into home, the results implied that students shared their learning with family members. Hence, one tendency in family is that even though there are lot of disaster experiences in the community, sharing of disaster experience among family members are comparatively low compared with rest of two aspects. School learning into home is slightly higher and it is considered that students share their learning at home rather listening disaster related stories at home. Rural area is basically considered as maintaining the strong community linkage. However, in case of this community, community linkage shows comparatively low score as it obtained 2.4. This is because of limited numbers of community based activities and no activities of religious groups are observed. On the other hand, the community is prone to natural disasters including flood, landslide and drought. It may be possible that disaster experiences function to keep people aware of natural disasters.

In summary, in terms of media, warnings obtained through mass media by students. In the aspect of family, do's and don'ts is tended to be talked among family and students share their learning of schools with family members. In the component of community, limited opportunity of interaction through community activities or community meeting.

5.2.6.3 Comparative result and interpretation of informal education index

Comparative result of Dehradun and Rudraprayag is shown in Figure 5.11. Dehradun and Rudraprayag show same tendency in Media and Family, and Community aspect shows opposite tendency between urban and rural context.

In terms of Media, one difference is that students of Dehradun tend to obtain the warning on disasters through SNS while students of Rudraprayag obtain the warning through mass media. Thus, their main channel of getting the information were different.

Regarding the family component, both in Dehradun and Rudraprayag share the information on do's and don'ts among family members. Besides, in Rudraprayag family tends to talk about the possible occurrence of natural disasters.

In the sub-component of Community, it is basically considered that there are stronger community linkage in rural area, however, the index shows opposite results. There are religious groups and NGOs working in the surveyed community in urban context. Stronger community linkage is essential for effective disaster response hence some activities to make community linkage strong helps to enhance the community resilience in rural area.

In summary, there is no difference of available media between Dehradun and Rudraprayag. In the family aspect, it showed same tendency in conversation among family members, sharing of disaster experience at school learning into home. Even though Rudraprayag is affected more frequently by natural disasters, the sharing of disaster experience among family shows same level.

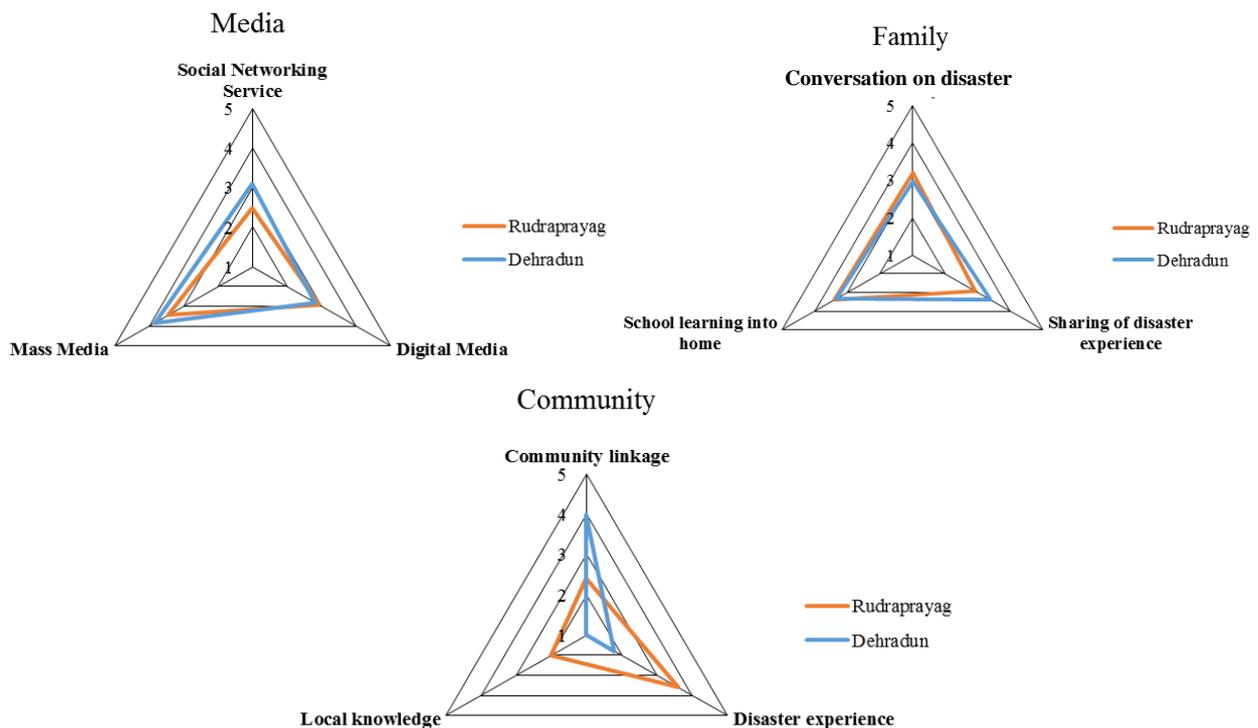


Figure 5.11 Comparative result of informal education index

5.2.6.4 Key findings in informal education

Following aspects are identified in the context of informal education.

Dehradun context

- Warnings obtained through SNS
- Weather forecast and news are obtained through mass media
- Do's and don'ts is tended to be talked among family
- Students share their learning of schools with family members
- Activities of religious group and NGOs create opportunities of interaction among community members

Rudraprayag

- Warnings obtained through mass media
- Do's and don'ts is tended to be talked among family

- Students share their learning of schools with family members
- Limited opportunity of interaction among community members due to limited community level meeting
- Affected frequently by natural disasters (flood, landslide)

Common

- SNS, internet media, and mass media are available
- Conversation among family members, sharing of disaster experience and school learning into home show equal tendency and there is no difference between Dehradun and Rudraprayag
- Even though Rudraprayag is affected more frequently by natural disasters, the sharing of disaster experience among family shows same level

5.2.7 Summary of the result of IDRE

Thus, IDRE based survey was implemented. In fact, in case of formal education, it is identified the similar aspects with the result of the interview. It implies that the developed IDRE shows the picture of status of implementation in formal education.

As a result of formal education, even though the degree of localization of Social Science, if teacher has knowledge on DRR, it leads to give location specific contents at school. In addition, in the Chapter 4 it was suggested to give training on DRR to incorporate DRM into school management and structural safety, however, the result of IDRE suggest that SMC can be the key for it. As SMC consists of teachers as well as parents and community members, giving a role to SMC can be the better solution because the knowledge can be disseminate to local community as well. Besides, role of non-formal education sector includes the development of educational materials which can attract learners. In case that non-formal education sector implement the DRR related program at school, it should collaborate with formal education sector then the effect of the program remained at school.

Table 5.6 Challenges in formal and non-formal education

	Common	Dehradun	Rudraprayag
Formal	<ul style="list-style-type: none"> ● There is no mechanism of checking structural and non-structural safety of school building 	<ul style="list-style-type: none"> ● The knowledge about structural safety is not included in the teachers' training ● No training for SMC 	<ul style="list-style-type: none"> ● Low frequency of program of NSSP as co-curricular activities ● Lack in manual/textbook for co-curricular activities
Non-formal	<ul style="list-style-type: none"> ● Training and capacity building for community body is not held 	<ul style="list-style-type: none"> ● As specified in "Common" 	<ul style="list-style-type: none"> ● There is no follow-up scheme after teachers' training and mock drills of NSSP ● Community participation to program of NSSP is not promoted

The result of informal education suggest that the students share their learning of schools with family. It suggests that better implementation of DRR education at school leads to the knowledge transfer to family. In addition, according to the IDRE for formal and non-formal education, challenges were identified as Table 5.6.

5.3 Qualitative assessment of DRR education in Uttarakhand

Focus Group Discussion (FGD) with problem tree analysis was adopted to identify the core problems and their cause and effect to implement DRR education among stakeholders in DRR education.

5.3.1 Methodology of problem tree analysis

Problem tree analysis is used to “find solutions by mapping out the anatomy of cause and effect around an issue” (ODI, 2009). Before implementing the discussion, overview result of IDRE was shared among participants of discussion. Then, each participant was asked to write issues they face in implementing DRR education in the field on the distributed sticky notes. After they finished to write issues, issues they face were shared among participants and built problem tree in accordance with the cause and effect. The example of the problem tree is shown in Figure 5.12. The core problem is established in the central part, and cause and effect are built according to the discussion among participants.

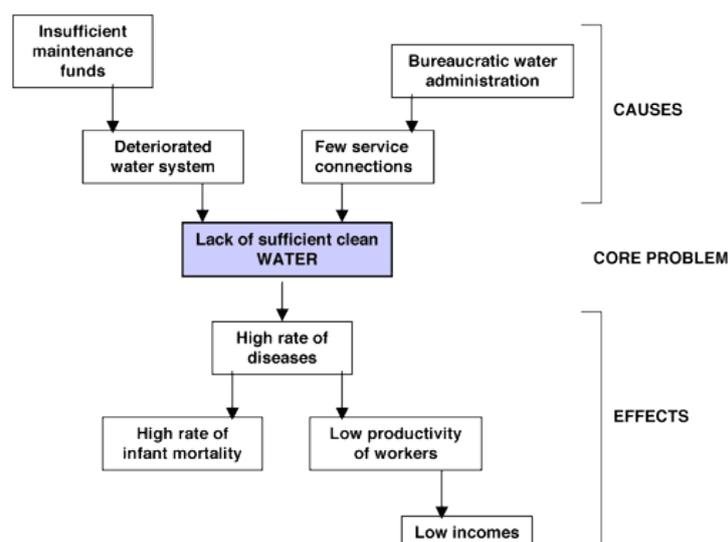


Figure 5.12 Example of problem tree (World Bank, 2001)

5.3.2 Implementation of FGD

FGD was held on September 19, 2015 in Dehradun and September 10, 2015 in Rudraprayag for one hour each. FGD was held after the data collection of IDRE both in Dehradun and Rudraprayag. Hence, the respondents of IDRE-based survey was invited to the discussion. Besides, some other stakeholders who were involved in DRR education in each district were also invited. As a result, three out of six participants were those who responded to the IDRE-based survey in both districts and rest of three participants were those who were involved in DRR education. In case of Dehradun district, one officer from DIET, one officer from DDMA, two officers from DMMC, one staff from NGO, one program coordinator of UNDP

as listed in Table 5.7 were attended. In Rudraprayag, one officer from district education office, one officer from DDMA, one program coordinator of NSSP, two NGO staffs and one staff from community radio station were collaborated for the discussion as listed in Table 5.8. The procedure of the discussion is shown in Table 5.9. Since the IDRE was conducted, the summary of results were shown before starting FGD.

Table 5.7 Participants of focus group discussion held in Dehradun

No.	Position	Organization
1	Senior Lecturer	DIET Dehradun
2	Jr. Executive	DMMC
3	Assistant Engineer	DMMC
4	Resource Person	Azim Premji Foundation, Dehradun (NGO)
5	Program Coordinator	UNDP-DMMC program
6	District Disaster Management Officer	District Disaster Management Authority

Table 5.8 Participants of focus group discussion held in Rudraprayag

No.	Position	Organization
1	District Disaster Management Officer	District Disaster Management Authority
2	District Program Coordinator	National School Safety Programme
3	Assistant Engineer	District Education Office
4	Station Head	Mandakini Kee Awaaz (Community Radio Station)
5	Program Coordinator	SMBA-SEEDS program
6	Civil Engineer	SEEDS India Rudraprayag

Table 5.9 Procedure of FGD

	Activity	Time
1	Explanation of objectives and procedure of FGD	5 minutes
2	Explanation of results of IDRE	10 minutes
3	Writing the problems face on sticky paper	10 minutes
4	Sharing of problems among participants	10 minutes
5	Discussion to identify the core problem and its cause and effect	20 minutes
6	Summary of discussion	5 minutes

5.3.3 Result of focus group discussion

5.3.3.1 Result of focus group discussion in Dehradun

The results of focus group discussion is shown in Figure 5.13. Theme of discussion was diversified and they were basically categorized into four dimensions of issues; education, teachers' training, structural safety and institutional issues. All the participants agreed that common issues of them were the lack of national level policy direction, which was circled by red color at the bottom of Figure 5.13. In the dimension of education, budget was not allocated and it lead to the limitation in promoting DRR education

at school especially the development of materials. In case of teachers' training, no support of incorporating DRR issues into teachers' training was held. Then, it lead to the lack of training in DRR, human resources and monitoring. Preparedness for disaster was not prioritized yet due to the lack of education as well as specialized trainers in DRR. In fact, budgetary issue corresponds to the result of formal education index in Dehradun as policy showed low score.

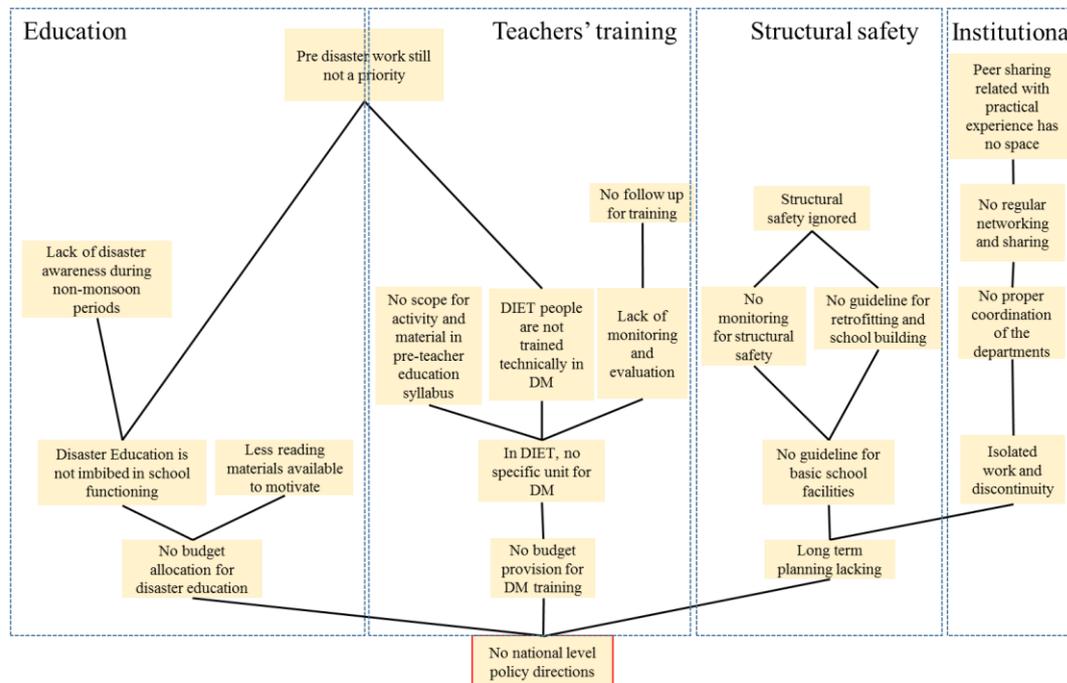


Figure 5.13 Problem tree in Dehradun

In the dimension of structural safety, guideline for structural safety was absent. Absence of guideline was linked with the issues of monitoring structural safety and retrofitting of schools. Thus, structural safety was ignored. On the right side of the Figure 5.13 shows the institutional problems. In fact, all the participants mentioned the lack of coordination among stakeholders working on DRR education. In the discussion, government officers and NGOs were attended and they were not aware of each other. Therefore, the needs of organizing the opportunities to exchange the information among stakeholders were addressed.

In summary, absence of national level policy direction leads to the low implementation of DRR education, teachers' training, vulnerable school building and weak coordination among stakeholders.

5.3.3.2 Result of focus group discussion in Rudraprayag

The result of the discussion in Rudraprayag is shown in Figure 5.14. Opinions of participants were shared and the core problem was identified as “knowledge is not transferred to students from teachers” as highlighted with red. In fact, the coordinator of NSSP had lot of opportunities to interact with the teachers and teachers felt overburdened due to the work. Even though the training was given to teachers in Rudraprayag, they could not deliver the knowledge to students. Since the knowledge was not transferred from teachers to students, its knowledge was not conveyed to community from students. As informal

education index in Rudraprayag implied the tendency that students told their learning at home and this habit could not be fully utilized under this condition. School is a hub of knowledge and teachers' role is highlighted in the discussion.

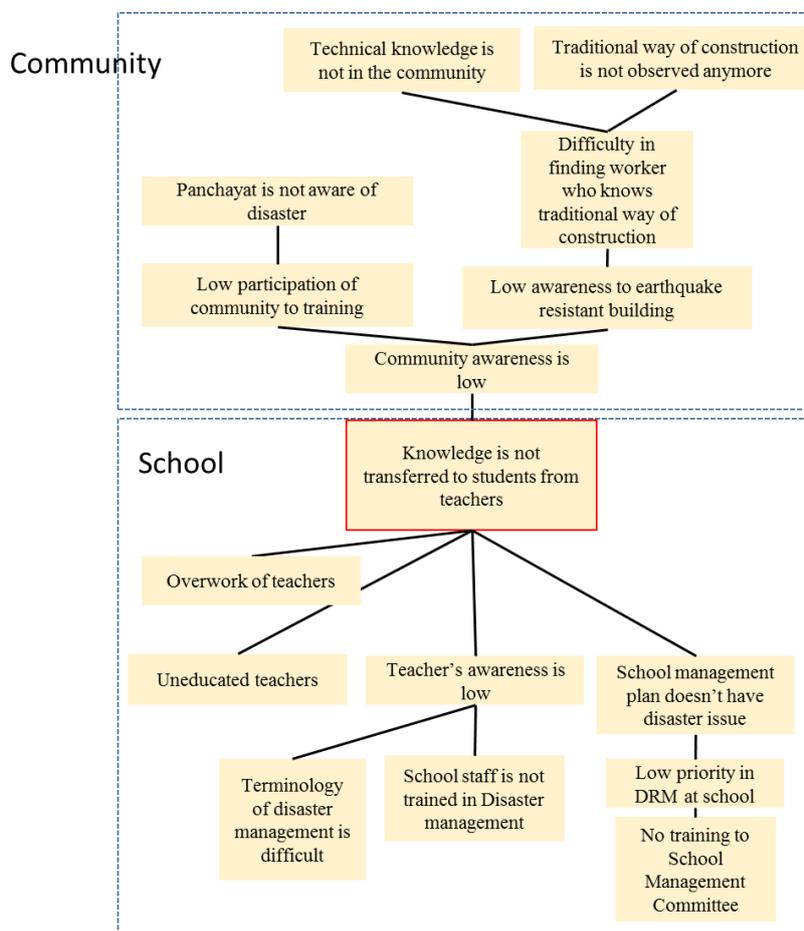


Figure 5.14 Problem tree in Rudraprayag

5.3.3.3 Summary of the results of FGD

The result of the FGD in Dehradun showed that core problem was the lack of national level policy directions and the core problems caused the weakness in four dimensions of education, teachers' training, structural safety and institution. On the other hand, the result of the FGD in Rudraprayag focused more on the educational practices at school and its delivery to community. The core problem were identified as "Knowledge is not transferred to students from teachers" and the results suggested that increasing teaching capacity leads to the knowledge transfer from teachers to students, and it resulted to disseminate the knowledge towards community.

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Chapter 6. Discussion and conclusion

6.1 Key findings

There are different types of DRR education held in Dehradun and Rudraprayag and they are categorized into formal, non-formal and informal education. Chapter 2 described that coordinated implementation of three modes of education can enhance the effectiveness of DRR education. Based on the interviews and IDRE, following aspects were identified as important factors for DRR education from the viewpoint of synergetic implementation.

In the context of formal education, the implementation of curriculum, co-curricular activities and teachers' training on DRR rather depend on the cooperation with organizations specialized in DRM than policy, although the cooperation among stakeholders are temporal and realized through the effort of individual organizations. Hence, institutionalizing the cooperation is required. In addition, one key factor is the teachers' training given by the specialized organizations in DRM as teachers can utilize the DRR knowledge for curriculum implementation as well as co-curricular activities. In fact, there was the example in Dehradun that teachers implemented co-curricular activities related with DRR as the teachers had DRR related training. Although the implementation of DRR education can be promoted through teachers' training collaborating with specialized organizations, school management did not have DRM perspectives in Dehradun and Rudraprayag except the school which was under NSSP. The study suggested that SMC can be the key to incorporate DRM into school management. The challenges for both schools in Dehradun and Rudraprayag in terms of school management were identified as monitoring the structural and non-structural safety of school building as well as the lack of DRM perspective in school management. SMC is the legalized body under RTE act and all the schools under state government is obliged to establish it. Hence it can be the entry point to bring DRM in school management.

In terms of non-formal education, it was found that there were no promotion of community participation in the program such as UNDP-DMMC and NSSP. As Chapter 2 pointed out that the school can be a hub to disseminate the DRR knowledge to community in case that community participation to school activities are promoted. Therefore, the linkage between school and community must be improved for effective DRR education and it also links with the informal education.

Although formal and non-formal education sectors collaborated each other to promote DRR education, considering the clear linkage of informal education with other two modes of education is important to suggest the synergetic implementation of three modes of education. As Chapter 2 described, knowledge transfer in informal education is held through media such as mass media, social networking service (SNS) and community radio, and the interaction among family and community. Besides, educational materials such as documentary, movies and storybooks are used as tools for knowledge transfer. Local knowledge is also a part of informal education and some of the local knowledge such as reading color of clouds for predicting heavy rainfall and observing dried trees to predict surface erosion were identified through study. One challenge is their scientific validations as local knowledge is not proven scientifically. Besides, this

study identified that students tended to share their learning from school to family members. It implies that better implementation in formal and non-formal education promotes the knowledge transfer to family.

From the FGD, it was identified that lack of national policy interlinked with the issues of implementation of DRR education, teachers’ training, structural safety and coordination among different stakeholders in Dehradun. From the result of FGD in Rudraprayag, the core problem is that the knowledge is not transferred to students from teachers. Besides, teachers are overburdened, therefore, this result also justify to give a role of DRM to SMC while teachers take responsibility to teach DRR through curriculum and co-curricular activities.

6.2 Challenges for DRR education

The challenges in DRR education identified through study are shown in Table 6.1. In case of Dehradun district, the main challenges are related with school structural and non-structural safety as well as DRM perspective in schools. On the other hand, the challenges that Rudraprayag have is related to the implementation aspects such as teachers’ training, low frequency in co-curricular activities and lack in materials, in addition to the structural safety and school DRM. Hence, from next section, based on the results of the study, the solution to these issues are suggested.

Table 6.1 Challenges for DRR education in Dehradun and Rudraprayag

	Common	Dehradun	Rudraprayag
Formal	<ul style="list-style-type: none"> ● No mechanism of checking structural and non-structural safety of school ● No provision of DRM in school management 	<ul style="list-style-type: none"> ● The knowledge about structural and non-structural safety is not included in the teachers’ training ● No training for SMC 	<ul style="list-style-type: none"> ● The teachers’ training on DRR discontinued ● Low frequency of program of NSSP as co-curricular activities ● Lack in manual/textbook for co-curricular activities
Non-formal	<ul style="list-style-type: none"> ● No parents and community participation to school DRR activities 	<ul style="list-style-type: none"> ● As listed in the column of “Common” 	<ul style="list-style-type: none"> ● There is no follow-up scheme after teachers’ training and mock drills of NSSP
Informal	<ul style="list-style-type: none"> ● Scientific validation of local knowledge is not held 	<ul style="list-style-type: none"> ● As listed in the column of “Common” 	<ul style="list-style-type: none"> ● As listed in the column of “Common”

6.3 Toward institutionalization of DRR education

As key findings and challenges mentioned above, it was identified the weakness in school DRM, while the study pointed out that the SMC can play key role to incorporate school DRM into school. The key findings also identified that teachers’ training can enhance the effectiveness of DRR education at school level from point of view of three modes of education. However, in order to realize the synergetic implementation of three modes, institutionalizing government level coordination is important in order to overcome the challenges pointed out in Dehradun. If the coordination among stakeholders are well implemented, it leads

to the better implementation of DRR education as key findings pointed out the effectiveness of cooperation among stakeholders. Therefore, the institutionalization of DRR education is discussed from the point of view of school DRM, implementation of DRR education and coordination among stakeholders.

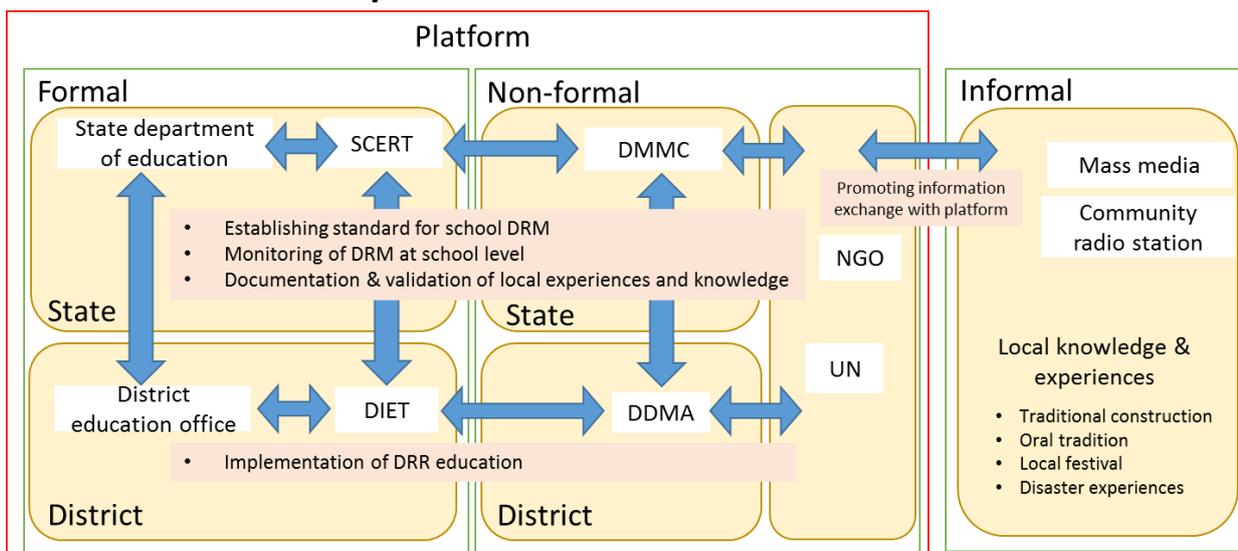
6.3.1 Effective school DRM

This study indicated that SMC can be the key to incorporate DRM into school management. IFC (2010) showed that the objectives of school disaster management was to protect students and the staff from physical harm and to minimize disruption and ensure the continuity of education. Therefore, IFC (2010) suggested that school DRM included assessment and planning, physical and environmental protection, and response capacity development. Assessment and planning mean to evaluate the risks, hazards, and vulnerabilities and capacities of school, and incorporate them into school management. Physical and environmental protection indicates the monitoring of structural safety, maintenance and non-structural mitigation. Response capacity development includes to determine the procedures in case of natural disasters and foster the response skills and organization. Hence, these function should be given to SMC.

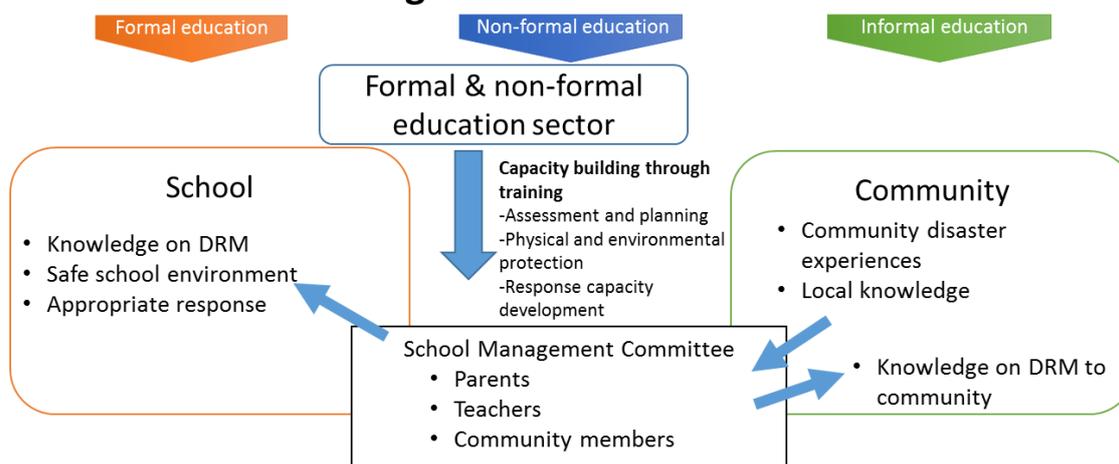
The advantage of incorporating DRM to SMC is that firstly it is established at all schools under state government and government aided schools. Therefore, it does not necessarily establish the new committee for DRM. Secondly, SMC is given a role to select land for new construction and administrate school construction, although technical part is monitored by engineers. Therefore, SMC has influence to school structural safety. Thirdly, certain amount of fund is allocated to schools for maintenance of school facilities, which fund is managed by SMC. Fourthly, SMC plays role in developing School Development Plan. Fifthly, SMC consists of teachers, parents and community members. Taking these aspects into consideration, the advantage of SMC is as follows. It does not necessary to develop new legal framework to establish new committee for DRM, and if the DRM perspective is given to SMC, there are potentials of using allocated fund for school maintenance with DRM perspectives, and the DRR knowledge can be disseminated from SMC to communities, at the same time it promotes the community participation to school activities through SMC. Promotion of community participation can bring community's disaster experiences and local knowledge into SMC. The advantage of using community's disaster experiences and local knowledge is that they include the local priorities and perceptions against disasters, they represent the interest and values of communities, and they lead to enhance the ownership to the community (Peters-Guarin et al., 2012). Hence, promotion of community participation and bringing community's experiences and knowledge are important for effective school DRM. Therefore, the challenges which observed for both district such as lack of monitoring school structural safety and lack of DMR in school management, and lack of community participation to school activities are improved at the same time and use of community's experiences and knowledge lead to effective school DRM. However, there is a challenge of validating the effectiveness of local knowledge, which is discussed later.

Then, the mechanism of adding new role to SMC and giving training should be considered. In terms of adding new role, government order of the state of Uttarakhand prescribed that one of the functions and

Multi-stakeholders platform



School disaster risk management



Disaster risk reduction education

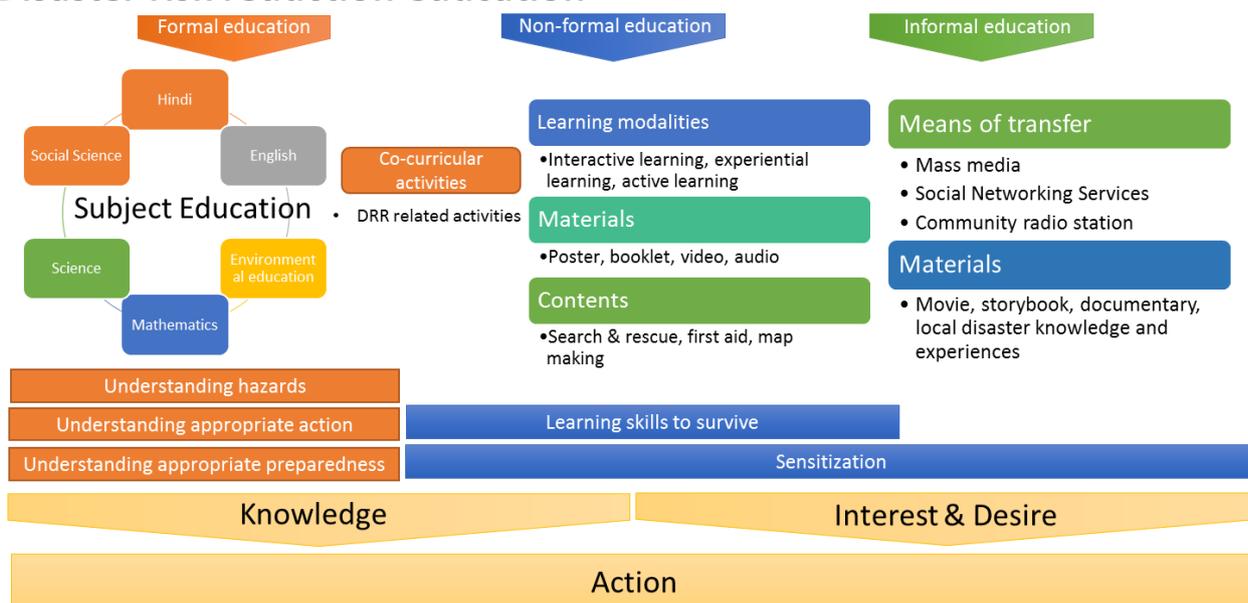


Figure 6.1 Conceptual model of institutionalization of DRR education

responsibilities of SMC is “to execute the policies and instructions laid down by the state government/department at different intervals” (Government of Uttarakhand, 2011). This order indicates that additional functions and responsibilities can be given without the modification of legal framework. In addition, same order prescribes that the training for SMC on general management of schools is given in the coordination of primary education (written as “director in primary education” in Figure 3.10) in state department of education. As state department of education does not have specialized knowledge in DRR, state department of education together with DMMC, which is the non-formal education sector can incorporate DRM perspectives into school management. The conceptual framework is shown in the middle of Figure 6.1.

6.3.2 Effective implementation of DRR education

The key findings indicated that effective curriculum implementation, co-curricular activities, and implementation of non-formal education at school can be improved through teachers’ training. Rudraprayag district has challenges in implementing training on DRR and low frequency of co-curricular activities in school, however the findings suggest that implementation of training on DRR also promote co-curricular activities. Therefore, in order to solve the challenges in Rudraprayag, implementation of teachers training on DRR is targeted. In fact, teachers training has advantages in better implementation of DRR education because it gave confidence to teachers to implement DRR education and promoted the DRR education in schools (Shiwaku and Fernandez, 2011). Besides, the study held by Shiwaku and Fernandez (2011) focused on the teachers’ training implemented by Japanese NGO SEEDS Asia, and the result showed that external organization specialized in DRR implemented the DRR training for teachers and resulted in promoting the DRR education at each school.

One advantage of DIET is to be able to propose the new teachers’ training with budget estimation in Annual Work Plan (AWP) to State Council for Educational Research and Training (SCERT). SCERT recognizes the importance of training on DRR and Rudraprayag district is highly prone to natural disasters, hence the incorporation of teachers training on DRR is probably achieved with budget allocation. However, DIET does not have know-how of giving training on DRR. Although NSSP has the component of teachers training, committee of NSSP does not include DIET, but district education department. Hence, firstly it is required to make connection of DIET with DRR related authorities at district level such as DDMA, superintendent police, fire department and so on. 450 teachers are trained through NSSP in Rudraprayag, hence the know-how is already accumulated in NSSP. The important point is to institutionalize the teachers’ training in Rudraprayag as NSSP is not a permanent project.

In case that teachers training incorporate the DRR contents, it gives ripple effect to different stream of DRR education. Curriculum of Uttarakhand has six subjects related with DRR. The curriculum education in India aims to prepare a student for life, hence the relevant knowledge and appropriate skills, competencies and values are taught (NCERT, undated). For example, the curriculum in Uttarakhand in DRR context includes the understanding of hazards, appropriate actions in case of natural disasters and appropriate preparedness. Petal (2008) indicated that the curriculum infusion of DRR contents has

advantages because the topic has been reserved in the curriculum. In addition, curriculum is developed in accordance with the ages of learners and has structure. Hence improved understanding of teachers through DRR training is important to transmit the knowledge appropriately to students. However, curriculum education teaches mostly knowledge and it does not involve experience-based learning to obtain the practical skills, which is necessary in DRR education. In order to equip students with skills, co-curricular activities and non-formal education can be the options. Non-formal education features to utilize different types of learning modalities, materials and contents, and it gives interest to learners toward DRR. At the same time it equips skills. As explained earlier, teachers' training on DRR leads to motivate teachers and it leads to the effective implementation of co-curricular activities as well as non-formal education at schools.

In addition to the discussion above, informal education needs to be considered in order to suggest the institutionalized implementation of DRR education. As Chapter 2 explained, mass media, social networking service (SNS) and community radio can play the role of disseminating DRR related information in the phase of pre-, during and post-disasters. Especially, the advantage of SNS is to be able to transmit the localized information immediately through retweeting and sharing information within the specific community of people. In addition, community radio station has also the advantage of conveying the location specific information for community. The exposure to the information through these media can interest local people about DRR in the community and lead to enhance the knowledge. Besides, Hibino and Shaw (2014) mentioned that the community radio station established after Great Hanshin-Awaji earthquake continued to broadcast the knowledge and wisdom of those who experienced the disaster. Therefore, the community disaster experiences and local knowledge can also be transmitted through local media.

Chapter 2 indicated that documentary, movies and storybooks are also used as tool in informal education. In fact, some educational literatures pointed out that the use of movies and storybooks allow students to focus on the contents (Reilly and Ward, 1997; Philips, 2004). Therefore, the use of these educational materials in informal DRR education lead to transfer effectively the knowledge to the users. As above mentioned, community radio station incorporated the local disaster experiences and wisdoms after Great Hanshin-Awaji earthquake, similar practices to incorporate local disaster experiences and knowledge into documentary, movies and story books are observed. First example is that the documentary of disaster experiences. DMMC has collected the local disaster experiences from communities and developed the documentary named "Mahesh Bhatt's Call of the Himalaya" and "Buried village". These documentary tells not only the disasters in local community, but also the importance of community involvement for DRR. Second example is the movie "The Silent Heroes" which is the real life story of 13 deaf children in Uttarakhand. In the movie, 13 deaf children challenged to mountaineering in the Himalayan Mountains in order to obtain the respect from others. Throughout the movies, the extreme weather and harsh natural conditions are described. Hence the movie include the DRR educational aspects. Third example shows that local disaster experiences and knowledge are used in the formal and non-formal education, which aspects are important for institutionalization. In 1854, the great earthquake and tsunami hit the Hiro village, which is presently located in Wakayama prefecture, Japan. Then, one person put the fire on rice sheaves at the

middle of mountain and informed residents that the tsunami was reaching to the village. It resulted to save a lot of lives. The story is conveyed as “Inamura no Hi (Fire of rice sheaves)” and it is adopted in textbook of Japanese language for class five in 2012 (Sakurai, 2013). In addition, the story is introduced by Japan Meteorological Agency as a tool of DRR education (JMA, 2003). Asian Disaster Risk Reduction Center translated the story into nine languages and developed the illustrative storybooks with the aim of being utilized in Asian countries as well (ADRC, undated). Thus, these are examples that local knowledge and experiences are documented and transferred through different types of media such as textbook, documentary, movies and storybooks by formal education and non-formal education sectors.

One challenge of utilizing local knowledge is that it is not scientifically validated unlike scientific knowledge (Gaillard and Mercer, 2013). Hence, in case that local disaster experiences and local knowledge are used through media, schools and communities, its effectiveness should be validated scientifically. One advantage of incorporating local experiences and knowledge into formal and non-formal education is to be able to validate them from scientific perspectives. In case of incorporating local knowledge into formal education, state department of education has a committee to check scientifically the educational contents. DMMC as non-formal education sector has the accumulated scientific knowledge on disasters and disaster risk management in Uttarakhand, hence the contents can be validated when DMMC transforms the local knowledge into educational materials. The process to prove scientifically the local knowledge follows, firstly to observe the local knowledge, secondly to document it, thirdly to validate it and fourthly integrate into science (Hiwasaki et al., 2014). Therefore the institutionalized implementation of formal, non-formal and informal education can be achieved.

The knowledge transfer discussed in this section can also be explained from KIDA model, which stands for “Knowledge, Interest, Desire, and Action”. This model describes that the combination of Knowledge for hazards, actions and preparedness, which is fostered through curriculum education, and the Interest and Desire towards DRR which are fostered through co-curricular activities, non-formal education, and use of informal education lead to the actual action for DRR. The conceptual model is shown below in Figure 6.1.

6.3.4 Coordination among stakeholders

In the above two sections, it is explained that there is a need of governmental coordination to incorporate DRR perspectives into SMC at state level, and to implement teachers’ training on DRR at district level. In addition, the result of FGD in Dehradun suggested the lack of coordination among different stakeholders. Therefore, mechanism of coordination among different stakeholders at state as well as district level should be considered to support the implementation of effective school DRM as well as DRR education. One example of multi-stakeholders coordination among governmental and non-governmental organizations is observed in Nepal. Although Nepal has worked at national level, hence the context is different from state and district, multi-stakeholders collaboration started to function even before the 2015 Gorkha earthquake, with the participation of national government, UN organization and NGOs. This collaboration succeeded in developing the manual for teachers’ training on DRR and manual for DRR related curriculum implementation. This type of multi-stakeholders platform create space for collaboration and participation,

and space for learning and sharing (Djalante, 2012). Hence it is suggested to establish multi-stakeholders platform for DRR education in Uttarakhand with the participation of governmental and non-governmental organizations at state as well as district level. The platform can be coordinated by DMMC because DMMC already has the experiences of implementing DRR education and teachers' training in the collaboration with various stakeholders including department of education. The function given to the platform is to establish the standard of DRM for school including how SMC monitors the school structural and non-structural safety, implementation of curriculum and co-curricular activities in terms of DRR education. In the district level, they can collaborate to implement DRR education in terms of co-curricular activities, some schemes of non-formal education and teachers' training. Furthermore, this platform can also has function to strengthen linkage among formal, non-formal and informal DDR educations. As mentioned earlier, in order to incorporate local disaster experiences and knowledge into formal and non-formal education, there require the process of scientific validation. Hence, the platform can play role to observe the local knowledge such as traditional construction, oral tradition, local festival and disaster experiences, and document, and validate them to be utilized as tool of DRR education in formal, non-formal and informal education contexts. In addition, media has potential of linking different stakeholders. Hibino and Shaw (2014) indicated that especially community radio can foster the communication between local people and local government, and between local government and NGOs. Hence, promoting the interaction of media with platform lead to the information exchange, and it results to transfer the science based knowledge in informal education. The concept explained in this section is shown in top of Figure 6.1.

6.4 Conclusion

Education is categorized into three modes, formal, non-formal and informal education and they correspond to the practices of DRR education in Dehradun and Rudraprayag district of Uttarakhand. In terms of formal DRR education, the curriculum is infused with DRR related contents, and a stand-alone chapter on disaster management has been prepared in the subject of social science. Co-curricular activities include practical skills such as training for search and rescue, and first aid. In terms of non-formal DRR education, local authority on DRR implements DRR education programs for schools as well as communities together with the support of external organizations. Informal means of knowledge transfer is also observed in communities of Dehradun and Rudraprayag, such as telling the school learning at home and disaster related local knowledge in disaster prone area. This study aimed to answer the question of how can three modes of education synergistically be implemented for effective disaster risk reduction. Important factors for synergetic implementation are as follows.

- Policy is not a critical factor to promote the DRR education in terms of infusion of DRR contents into curriculum, co-curricular activities and teachers' training in formal education context
- Cooperation among department of education (formal education sector) and organizations specialized in DRR such as DMMC and Disaster Management Cell (non-formal education sector) promote the incorporation of DRR related contents into curriculum, co-curricular activities and teachers' training
- Teachers' training through formal education and non-formal education is a factor to lead to effective DRR education implementation of curriculum, co-curricular activities and non-formal education held at school

- DRR knowledge learnt at school (formal education) is transferred from students to family (informal education)
- SMC is the key to incorporate DRM into school management and ensure school structural and non-structural safety
- SMC is the nodal point of community and school, and able to bring the community's disaster experiences into school (formal and informal education)
- Multi-stakeholders' platform to standardize the DRM at school, monitor the implementation of DRR education and document local knowledge and experience lead to institutionalized implementation of DRR education (formal, non-formal and informal education)

Therefore, it is better option to promote the multi-stakeholders collaboration than establishing DRR related policy, in order to incorporate DRR contents into curriculum, co-curricular activities and teachers' training, to implement non-formal education at school, and to disseminate local knowledge and experiences of disasters. Students share their learning at school with family, thus three modes of education are synergistically implemented. In terms of school DRM perspective, incorporation of DRM into SMC function leads to protect physically the students and teachers from natural hazards, to promote community participation to school, and to bring community disaster experiences into school DRM. This also implies the synergy of formal, non-formal and informal education. The suggestion made through this thesis is based on the studies in state of Uttarakhand. Hence, further study is required to identify the applicability to other areas including the effectiveness of suggested conceptual framework of institutionalization.

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Appendix 1 List of question for state department of education

List of Question for state department of education

<About law, policy>

- Is there any law/policy for universal education?
- Is there any education policy relevant to DRR education?

<About school management>

- Does education board promote the establishment of School Management Committee?
- Are safety issues included into School Management Committee?
- Does education board promote the establishment of School Disaster Management Committee?

<About safety of school building>

- What kind of safety norms are applied to construct school?
- Is there any mechanism of monitoring school building?
- Is there any budget allocated for monitoring facilities, equipment, infrastructure and so on?

Appendix 2 List of question for SCERT

List of Question for SCERT

<Curriculum>

- What topic on DRR is included into curriculum?
- What is the difference between CBSE curriculum and Uttarakhand curriculum?
- Is there any recommendation or guideline of disaster education from central gov.?
- What is the mechanism of approving, monitoring and updating the curriculum?

<Co-curricular activities>

- Does co-curricular activities are conducted in Uttarakhand?
- Are there any contents related with DRR in co-curricular activities?
- What is the mechanism of conducting co-curricular activities?

<Teacher's training>

- What is the mechanism of delivering training?
- Are there the contents related with DRR education in training?

Appendix 3 List of question for district education office

List of Question for district education office

<Localized information>

- What is the major educational challenge in Dehradun/Rudraprayag?

<About DRR education>

- Does district education office promote some DRR related activities both in curriculum and co-curricular activities?
- Does district education office promote some DRR related activities besides curriculum and co-curricular activities?

<About school management>

- Does district education office promote the establishment of school management committee?
- Does district education office promote the establishment of school disaster management committee?

<About safety of building >

- What is the process of constructing new school?
- To what extent the school building is newly constructed and/or repaired under SSA?
- Is there any mechanism of monitoring school building?
- Is there any budget allocated for monitoring facilities, equipment, and infrastructure?

Appendix 4 List of question for DIET

List of Question for DIET

<Structure of DIET>

- Structure of DIET
- What is the contents of training?

<About teachers training in DRR>

- Does DIET provide DRR related training?
- Does DIET prepare educational materials for teachers on DRR?
- What is the mechanism of evaluating the outcomes of teachers training?

Appendix 5 List of question for school

List of Question for School

<Basic information>

Name of School			
Location of School			
Management	Central School	State School	Private School
Curriculum	CBSE	State Board of Edu. CBSE Pattern	ICSE/ISC
Examination	CBSE	State Board of Edu.	ICSE/ISC
Number of Teacher			
Number of Staff			

<Number of student>

Primary				
Class 1	Class 2	Class 3	Class 4	Class 5
students	Students	students	students	students
Upper Primary			Secondary	
class 6	class 7	class 8	class 9	class 10
students	Students	students	students	students
Higher Secondary				
class 11	class 12			
students	students			

Number of student drop out per year	
Number of class room	
Fire extinguisher (type)	
Drinking water	
Toilet	
Computer/TV	

<Interviewee>

<General background of school>

<Disaster risk management related committee, planning>

- Is there any school management committee?
- Is there School Disaster Management Committee?
- Is there School Disaster Management Plan?
- Do your school take any preparative measures to disaster?
- Do your school incorporate disaster related content into school planning and management?

<Status of implementation of disaster education>

- Do your school impart the subject/chapter on disaster management?

<Co-curricular activities>

- Do your school implement disaster related activities? (Mock drill, town watching, writing/drawing competition)
- Do your school have NCC, NSS and Scout and Guide?
- If yes, they do disaster related activities?

<School safety>

- Do your school conduct periodical check of school building?
- Have you identified school risks or vulnerability?
- Have you received any specific training on disaster management?

Appendix 6 List of question for DDMA Dehradun

List of Question for DDMA Dehradun

<Function of DDMA>

- What is the main function of DDMA?

<DRR related activities>

- Does DDMA conduct disaster management related activities for student at school?
 - If yes, how often? With whom? Contents etc
- Does DDMA conduct disaster management related activities for teacher?
 - If yes, how often? With whom? Contents etc
- Does DDMA conduct disaster management related activities for community?
 - If yes, how often? With whom? Contents etc

Appendix 7 List of question for DDMA Rudraprayag

List of Question for DDMA Rudraprayag

<Reconstruction from 2013 disasters>

- How is the situation of reconstruction/rehabilitation?
- Is lessons learned reflected?

<Function of DDMA>

- What is the main function of DDMA?

<DRR related activities>

- Does DDMA conduct disaster management related activities for student at school?
 - If yes, how often? With whom? Contents etc
- Does DDMA conduct disaster management related activities for teacher?
 - If yes, how often? With whom? Contents etc
- Does DDMA conduct disaster management related activities for community?
 - If yes, how often? With whom? Contents etc

Appendix 8 List of question on NSSP

List of Question on NSSP

<Project outline of NSSP in Rudraprayag>

- Target of the program
- What is the procedure/Criteria of selecting schools?
- Which organization is involved in NSSP?

<Activities implemented under NSSP>

- Could you explain the component of NSSP in the district?
- Is there any change observed before and after the programme?
- Is there opportunity that parents and community residents participate at NSSP programme?

Appendix 9 List of question for community

List of Question for Community

<Disaster experiences>

- What kind of disasters happen in the area?

<Local knowledge>

- Is there any monument on disaster?
- How do you know if landslide can happen?
- How do you know if it will rain?
- How do you know if earthquake will happen?
- Is there any festival relevant to disaster?
- Is there any folk tale on disaster?
- Is there any structure which is resistant to natural disaster?
- Have you heard about the story of past disaster?

<Community linkage>

- Is there any community organization?
- Is there any community activities such as clean-up project, recreation etc
- Is there any community based group such as youth group, woman group etc?

Appendix 10 Questionnaire survey format for formal education

Questionnaire survey for institutionalization of disaster education For Formal education, State of Uttarakhand, India

This questionnaire aims to quantify the status of implementation of disaster education with focus on the institutional aspect in State of Uttarakhand. The following questions are mostly qualitative aspect and you are kindly asked to answer objectively based on act, document, report etc. All the response and date obtained from this questionnaire will be strictly used for academic research purpose. The findings from this survey are expected to contribute to promote effective practice of disaster education in Uttarakhand.

Thank you very much for your kind cooperation.

1. Policy

Details of respondent

Full name: _____

Affiliation: _____

Phone: _____

Email: _____

Date when questionnaire was filled out: _____

1.1 Policy framework

1.1.1 Political commitment/legal framework for ensuring the universal education in compulsory education.

1. Not available	2. Weak	3. Medium	4. Strong	5. Very strong
---------------------	------------	--------------	--------------	-------------------

Reason of choice/Reference

--

1.1.2 Political commitment/legal framework for mainstreaming disaster education.

1. Not available	2. Weak	3. Medium	4. Strong	5. Very strong
---------------------	------------	--------------	--------------	-------------------

Reason of choice/Reference

--

1.1.3 Political commitment/legal framework for promoting the integration of disaster education into formal education.

1. Not available	2. Weak	3. Medium	4. Strong	5. Very strong
---------------------	------------	--------------	--------------	-------------------

Reason of choice/Reference

--

1.1.4 State education policy for promoting the integration of disaster education into formal education.

1. Not available	2. Weak	3. Medium	4. Strong	5. Very strong
---------------------	------------	--------------	--------------	-------------------

Reason of choice/Reference

--

1.1.5 Involvement of Multi-stakeholders in policy making process for the integration of disaster education into formal education (Ex. Cross-departmental committee)

1. No involvement	2. Weak	3. Medium	4. Good	5. Very good
----------------------	------------	--------------	------------	-----------------

Reason of choice/Reference

--

1.2 Policy Implementation

1.2.1 Implementation scheme to ensure the universal education in compulsory education.

1. Not available	2. Weak	3. Medium	4. Good	5. Very good
---------------------	------------	--------------	------------	-----------------

Reason of choice/Reference

--

1.2.2 Monitoring mechanism of implemented scheme for the universal education in compulsory education.

1. Not available	2. Weak	3. Medium	4. Good	5. Very good
---------------------	------------	--------------	------------	-----------------

Reason of choice/Reference

--

1.2.3 Implementation scheme for integration of disaster education into formal education.

1. Not available	2. Weak	3. Medium	4. Good	5. Very good
---------------------	------------	--------------	------------	-----------------

Reason of choice/Reference

--

1.2.4 Availability of monitoring mechanism of implemented scheme for integration of disaster education into formal education.

1. Not available	2. Weak	3. Medium	4. Good	5. Very good
---------------------	------------	--------------	------------	-----------------

Reason of choice/Reference

--

1.2.5 Involvement of Multi-stakeholders in policy implementation and monitoring for the integration of disaster education into formal education.

1. Not available	2. Weak	3. Medium	4. Good	5. Very good
---------------------	------------	--------------	------------	-----------------

Reason of choice/Reference

--

1.3 Evaluation

1.3.1 Institutional mechanism of evaluating policy achievement.

1. Not available	2. Weak	3. Medium	4. Good	5. Very good
---------------------	------------	--------------	------------	-----------------

Reason of choice/Reference

--

1.3.2 Policy achievement in universal education in compulsory education.

1. Not evaluated	2. Weak	3. Medium	4. Good	5. Very good
---------------------	------------	--------------	------------	-----------------

Reason of choice/Reference

--

1.3.3 Policy achievement in integration of disaster education into formal education.

1. Not evaluated	2. Weak	3. Medium	4. Good	5. Very good
---------------------	------------	--------------	------------	-----------------

Reason of choice/Reference

--

1.3.4 Institutional mechanism of reflecting evaluation and achievement into new policy making process.

1. Not available	2. Weak	3. Medium	4. Good	5. Very good
---------------------	------------	--------------	------------	-----------------

Reason of choice/Reference

--

1.3.5 Involvement of multi-stakeholders in policy evaluation for the integration of disaster education into formal education.

1. Not involved	2. Weak	3. Medium	4. Good	5. Very good
--------------------	------------	--------------	------------	-----------------

Reason of choice/Reference

--

2. Curriculum

Details of respondent

Full name: _____

Affiliation: _____

Phone: _____

Email: _____

Date when questionnaire was filled out: _____

2.1 Curriculum in disaster management

2.1.1 Disaster education is specified in the curriculum.

1. Not specified	2. Weak	3. Medium	4. Good	5. Very good
---------------------	------------	--------------	------------	-----------------

Reason of choice/Reference

--

2.1.2 Incorporation of contents on disaster management in school curriculum.

1. Not incorporated	2. Weak	3. Medium	4. Good	5. Very good
------------------------	------------	--------------	------------	-----------------

Reason of choice/Reference

--

2.1.3 Contents on disaster management are localized in the context of Uttarakhand

1. Not localized	2. Weak	3. Medium	4. Good	5. Very good
---------------------	------------	--------------	------------	-----------------

Reason of choice/Reference

--

2.1.4 Class hour which contains the contents on disaster management in school curriculum.

1. Not assigned	2. Weak	3. Medium	4. Good	5. Very good
--------------------	------------	--------------	------------	-----------------

Reason of choice/Reference

--

2.1.5 Involvement of multi-stakeholders in curriculum development in terms of the content on disaster management.

1. No involvement	2. Weak	3. Medium	4. Good	5. Very good
----------------------	------------	--------------	------------	-----------------

Reason of choice/Reference

--

2.2 Textbook

2.2.1 Textbook referred to disaster management contents along with the curriculum.

1. Not available	2. Weak	3. Medium	4. Good	5. Very good
---------------------	------------	--------------	------------	-----------------

Reason of choice/Reference

--

2.2.2 Content of textbook on disaster management are localized in the context of Uttarakhand

1. Not localized	2. Weak	3. Medium	4. Good	5. Very good
---------------------	------------	--------------	------------	-----------------

Reason of choice/Reference

--

2.2.3 % of accessibility to textbook (if textbook is issued enough number that all the students are accessible.).

1. 60-69%	2. 70-79%	3. 80-89%	4. 90-99%	5. 100 %
--------------	--------------	--------------	--------------	-------------

Reason of choice/Reference

--

2.2.4 Institutional mechanism of official approval of textbook

1. Not available	2. Weak	3. Medium	4. Good	5. Very good
---------------------	------------	--------------	------------	-----------------

Reason of choice/Reference

--

2.2.5 Involvement of multi-stakeholders in textbook development on disaster management.

1. Not involved	2. Weak	3. Medium	4. Good	5. Very good
--------------------	------------	--------------	------------	-----------------

Reason of choice/Reference

--

2.3 Evaluation

2.3.1 Availability of educational goals for evaluating students' achievement on disaster management content at curriculum.

1. Not available	2. Weak	3. Medium	4. Good	5. Very good
---------------------	------------	--------------	------------	-----------------

Reason of choice/Reference

--

2.3.2 Availability of periodical evaluation and revision of curriculum on disaster related contents.

1. Not available	2. Once in more than 5 years	3. Once per 4-5 years	4. Once per 2-3 years	5. Once a year
---------------------	---------------------------------	--------------------------	--------------------------	-------------------

Reason of choice/Reference

--

2.3.3 Availability of periodical evaluation and revision of textbook on disaster related contents.

1. Not available	2. Once in more than 5 years	3. Once per 4-5 years	4. Once per 2-3 years	5. Once a year
---------------------	---------------------------------	--------------------------	--------------------------	-------------------

Reason of choice/Reference

--

2.3.4 Institutional mechanism to reflect feedback on curriculum from individual schools and teachers to curriculum development

1. No available	2. Weak	3. Medium	4. Good	5. Very good
--------------------	------------	--------------	------------	-----------------

Reason of choice/Reference

--

2.3.5 Involvement of multi-stakeholders in evaluation and revision of curriculum and textbook on disaster related contents.

1. No involvement	2. Weak	3. Medium	4. Good	5. Very good
----------------------	------------	--------------	------------	-----------------

Reason of choice/Reference

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3 Co-curricular activities

Details of respondent

Full name: _____

Affiliation: _____

Phone: _____

Email: _____

Date when questionnaire was filled out: _____

3.1 Co-curricular activities

3.1.1 Incorporation of contents on disaster management into co-curricular activities.

1. Not incorporated	2. Weak	3. Medium	4. Good	5. Very good
------------------------	------------	--------------	------------	-----------------

Reason of choice/Reference

--

3.1.2 % of schools that incorporate disaster management contents into co-curricular activities.

1. 60-69%	2. 70-79%	3. 80-89%	4. 90-99%	5. 100 %
--------------	--------------	--------------	--------------	-------------

Reason of choice/Reference

--

3.1.3 Frequency of co-curricular activities on disaster management

1. Not specified	2. Less than 3 times a year	3. 4-5 times a year	4. 7-8 times a year	5. More than 10 times a year
---------------------	-----------------------------------	------------------------	------------------------	------------------------------------

Reason of choice/Reference

--

3.1.4 Contents of co-curricular activities on disaster management customized for local context.

1. Not customized	2. Weak	3. Medium	4. Good	5. Very good
----------------------	------------	--------------	------------	-----------------

Reason of choice/Reference

--

3.1.5 Involvement of multi-stakeholders in implementing co-curricular activities on disaster management.

1. No involvement	2. Weak	3. Medium	4. Good	5. Very good
----------------------	------------	--------------	------------	-----------------

Reason of choice/Reference

--

3.2 Manual/Textbook

3.2.1 Educational materials prepared for co-curricular activities on disaster management.

1. Not prepared	2. Weak	3. Medium	4. Good	5. Very good
--------------------	------------	--------------	------------	-----------------

Reason of choice/Reference

--

3.2.2 Contents of educational materials on disaster management are customized for local context of Uttarakhand

1. Not customized	2. Weak	3. Medium	4. Good	5. Very good
----------------------	------------	--------------	------------	-----------------

Reason of choice/Reference

--

3.2.3 % of accessibility to educational materials (if educational material is issued enough number that all the students are accessible.)

1. 60-69%	2. 70-79%	3. 80-89%	4. 90-99%	5. 100 %
--------------	--------------	--------------	--------------	-------------

Reason of choice/Reference

--

3.2.4 Availability of equipment and instrument for conducting co-curricular activities on disaster management

1. Not available	2. Weak	3. Medium	4. Good	5. Very good
---------------------	------------	--------------	------------	-----------------

Reason of choice/Reference

--

3.2.5 Involvement of multi-stakeholders in elaborating educational materials for co-curricular activities on disaster management.

1. No cooperation	2. Weak	3. Medium	4. Good	5. Very good
----------------------	------------	--------------	------------	-----------------

Reason of choice/Reference

--

3.3 Evaluation

3.3.1 Availability of educational goals for evaluating students' achievement in the component of disaster management.

1. Not available	2. Weak	3. Medium	4. Good	5. Very good
---------------------	------------	--------------	------------	-----------------

Reason of choice/Reference

--

3.3.2 Availability of periodical evaluation and revision of co-curricular activities.

1. Not conducted	2. Once in more than 5 years	3. Once per 4-5 years	4. Once per 2-3 years	5. Once a year
---------------------	---------------------------------	--------------------------	--------------------------	-------------------

Reason of choice/Reference

--

3.3.3 Availability of periodical evaluation and revision of educational materials

1. Not conducted	2. Once in more than 5 years	3. Once per 4-5 years	4. Once per 2-3 years	5. Once a year
---------------------	---------------------------------	--------------------------	--------------------------	-------------------

Reason of choice/Reference

--

3.3.4 Institutional mechanism to reflect feedback on curriculum from individual schools and teachers to curriculum development

1. Not available	2. Weak	3. Medium	4. Good	5. Very good
---------------------	------------	--------------	------------	-----------------

Reason of choice/Reference

--

3.3.5 Involvement of multi-stakeholders in evaluation and revision of co-curricular activities and educational materials.

1. No involvement	2. Weak	3. Medium	4. Good	5. Very good
----------------------	------------	--------------	------------	-----------------

Reason of choice/Reference

--

4. Teacher's training

Details of respondent

Full name: _____

Affiliation: _____

Phone: _____

Email: _____

Date when questionnaire was filled out: _____

4.1 Teacher's training

4.1.1 % of the teachers who received training

1. Not available	2. Weak	3. Medium	4. Good	5. Very good
---------------------	------------	--------------	------------	-----------------

Reason of choice/Reference

--

4.1.2 Incorporation of the training contents on disaster management

1. Not available	2. Weak	3. Medium	4. Good	5. Very good
---------------------	------------	--------------	------------	-----------------

Reason of choice/Reference

--

4.1.3 Incorporation of the training contents on school safety (school buildings, facilities)

1. Not available	2. Weak	3. Medium	4. Good	5. Very good
---------------------	------------	--------------	------------	-----------------

Reason of choice/Reference

--

4.1.4 Trainer specialized in disaster management to provide training for teachers

1. Not available	2. Weak	3. Medium	4. Good	5. Very good
---------------------	------------	--------------	------------	-----------------

Reason of choice/Reference

--

4.1.5 Involvement of multi-stakeholders in implementing training on disaster management

1. No involvement	2. Weak	3. Medium	4. Good	5. Very good
----------------------	------------	--------------	------------	-----------------

Reason of choice/Reference

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4.2 Manual/Textbook

4.2.1 Manual/textbook on disaster management for teacher's training

1. Not available	2. Weak	3. Medium	4. Good	5. Very good
---------------------	------------	--------------	------------	-----------------

Reason of choice/Reference

--

4.2.2 Contents of Manual/Textbook on disaster management are localized in the context of Uttarakhand.

1. Not localized	2. Weak	3. Medium	4. Good	5. Very good
---------------------	------------	--------------	------------	-----------------

Reason of choice/Reference

--

4.2.3 Manual/textbook is prepared with the aim of promoting the teaching capacity of teachers along with the school curriculum.

1. Not prepared	2. Weak	3. Medium	4. Good	5. Very good
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Reason of choice/Reference

--

4.2.4 Manual/textbook includes the contents on school safety and security such as check of school buildings and facilities.

1. Not included	2. Weak	3. Medium	4. Good	5. Very good
--------------------	------------	--------------	------------	-----------------

Reason of choice/Reference

--

4.2.5 Involvement of multi-stakeholders in developing manual/textbook for training on disaster management

1. No involvement	2. Weak	3. Medium	4. Good	5. Very good
----------------------	------------	--------------	------------	-----------------

Reason of choice/Reference

--

4.3 Evaluation

4.3.1 Availability of training goals to evaluate teachers in teacher's training on disaster management component.

1. Not available	2. Weak	3. Medium	4. Good	5. Very good
---------------------	------------	--------------	------------	-----------------

Reason of choice/Reference

--

4.3.2 Availability of periodic evaluation and revision of teacher's training on disaster management component

1. Not available	2. Once in more than 5 years	3. Once per 4-5 years	4. Once per 2-3 years	5. Once a year
---------------------	---------------------------------	--------------------------	--------------------------	-------------------

Reason of choice/Reference

--

4.3.3 Availability of periodic evaluation and revision of textbook/manual on disaster management training

1. Not available	2. Once in more than 5 years	3. Once per 4-5 years	4. Once per 2-3 years	5. Once a year
---------------------	---------------------------------	--------------------------	--------------------------	-------------------

Reason of choice/Reference

--

4.3.4 Institutional mechanism to reflect feedback of teacher's training to training contents development

1. Not available	2. Weak	3. Medium	4. Good	5. Very good
---------------------	------------	--------------	------------	-----------------

Reason of choice/Reference

--

4.3.5 Involvement of multi-stakeholders in evaluation of teacher's training

1. No involvement	2. Weak	3. Medium	4. Good	5. Very good
----------------------	------------	--------------	------------	-----------------

Reason of choice/Reference

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5. School building/facilities

Details of respondent

Full name: _____

Affiliation: _____

Phone: _____

Email: _____

Date when questionnaire was filled out: _____

5.1 Safety in School building

5.1.1 (SSA) Availability of design of school building with all safety norms

1. Not available	2. Weak	3. Medium	4. Good	5. Very good
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Reason of choice/Reference

--

5.1.2 (SSA) Institutional mechanism of supervision by expert during new construction

1. Not available	2. Weak	3. Medium	4. Good	5. Very good
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Reason of choice/Reference

--

5.1.3 (SSA) Institutional mechanism for supporting the School Management Committee

1. Not available	2. Weak	3. Medium	4. Good	5. Very good
---------------------	------------	--------------	------------	-----------------

Reason of choice/Reference

--

5.1.4 (SSA) Institutional mechanism for periodical structural check of school building

1. Not available	2. Weak	3. Medium	4. Good	5. Very good
---------------------	------------	--------------	------------	-----------------

Reason of choice/Reference

--

5.1.5 (SSA) How many schools are newly constructed or under construction under SSA programme out of all planned/proposed construction by SMC (please specify in %)

1. Less than 10%	2. 11-25%	3. 26-50%	4. 51-75%	5. More than 75%
---------------------	--------------	--------------	--------------	---------------------

Reason of choice/Reference

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5.2 School location

5.2.1 % of schools that follows the norms of SSA and state education policy in terms of distance

1. 60-69%	2. 70-79%	3. 80-89%	4. 90-99%	5. 100 %
--------------	--------------	--------------	--------------	-------------

Reason of choice/Reference

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5.2.2 Availability of norms to restrict school location from the viewpoint of safety (flood, landslide etc)

1. Not available	2. Weak	3. Medium	4. Good	5. Very good
---------------------	------------	--------------	------------	-----------------

Reason of choice/Reference

--

5.2.3 Availability of safety norms to ensure the safety in route that students use

1. Not available	2. Weak	3. Medium	4. Good	5. Very good
---------------------	------------	--------------	------------	-----------------

Reason of choice/Reference

--

5.2.4 Availability of geological and geographical survey before the construction (if checked by specialist)

1. Not available	2. Weak	3. Medium	4. Good	5. Very good
---------------------	------------	--------------	------------	-----------------

Reason of choice/Reference

--

5.2.5 Investigation of past disaster to decide new school construction site

1. Not investigated	2. Weak	3. Medium	4. Good	5. Very good
------------------------	------------	--------------	------------	-----------------

Reason of choice/Reference

--

5.3 Safety in non-structural aspect

5.3.1 Availability of norms for safety in non-structural aspect

1. Not available	2. Weak	3. Medium	4. Good	5. Very good
---------------------	------------	--------------	------------	-----------------

Reason of choice/Reference

--

5.3.2 Availability of periodic monitoring mechanism of non-structural aspect from safety perspective

1. Not available	2. Weak	3. Medium	4. Good	5. Very good
---------------------	------------	--------------	------------	-----------------

Reason of choice/Reference

--

5.3.3 Availability of periodic monitoring mechanism of school area from safety perspective (if there is no risk of falling down rocks, trees, etc)

1. Not available	2. Weak	3. Medium	4. Good	5. Very good
---------------------	------------	--------------	------------	-----------------

Reason of choice/Reference

--

5.3.4 Institutional mechanism to conduct needs assessment of individual schools to improve non-structural component.

1. Not available	2. Weak	3. Medium	4. Good	5. Very good
---------------------	------------	--------------	------------	-----------------

Reason of choice/Reference

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5.3.5 Budget allocated for improving non-structural aspect from safety perspective per year

1. Not available	2. Weak	3. Medium	4. Good	5. Very good
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Reason of choice/Reference

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Thank you very much

Appendix 11 Explanation of each variables for questionnaire survey for formal education

Explanation of each variables for questionnaire survey For Formal education, State of Uttarakhand, India

1. Policy

1.1 Policy framework

1.1.1-1.1.4

Not available: Not mentioned

Weak: Slightly mentioned in the political commitment, legal framework, state policy

Medium: Mentioned in the political commitment, legal framework, state policy

Strong: Stated with main focus in the political commitment, legal framework, state policy

Very strong: Stated as one of priority within the political commitment, legal framework, state policy

1.1.5

No involvement: No involvement of other stakeholders

Weak: 1-25% of educational and disaster related governmental and private organization are involved

Medium: 26%-50% of educational and disaster related governmental and private organization are involved

Good: 51%-75% of educational and disaster related governmental and private organization are involved

Very good: 76%-100% of educational and disaster related governmental and private organization are involved

1.2 Policy Implementation

1.2.1-1.2.4

Not available: Not available

Weak: There is scheme/mechanism but hardly implemented

Medium: There is scheme/mechanism and they are implemented placing a person in charge

Good: There is scheme/mechanism and they are implemented establishing a group in charge

Very good: There is scheme/mechanism and they are implemented establishing a division in charge

1.2.5

No involvement: No involvement of other stakeholders

Weak: 1-25% of educational and disaster related governmental and private organization are involved

Medium: 26%-50% of educational and disaster related governmental and private organization are involved

Good: 51%-75% of educational and disaster related governmental and private organization are involved

Very good: 76%-100% of educational and disaster related governmental and private organization are involved

1.3 Evaluation

1.3.1

Not available: Not available

Weak: There is mechanism but hardly implemented

Medium: There is mechanism and they are implemented placing a person in charge

Good: There is mechanism and they are implemented establishing a group in charge

Very good: There is mechanism and they are implemented establishing a division in charge

1.3.2-1.3.3

Not evaluated: Not evaluated

Weak: 1-25% of achievement

Medium: 26%-50% of achievement

Good: 51%-75% of achievement

Very good: 76%-100% of achievement

1.3.4

Not available: Not available

Weak: There is mechanism and 1-25% reflected

Medium: There is mechanism and 26%-50% are reflected

Good: There is mechanism and 51%-75% reflected

Very good: There is mechanism and 76%-100% reflected

1.3.5

No involvement: No involvement of other stakeholders

Weak: 1-25% of educational and disaster related governmental and private organization are involved

Medium: 26%-50% of educational and disaster related governmental and private organization are involved

Good: 51%-75% of educational and disaster related governmental and private organization are involved

Very good: 76%-100% of educational and disaster related governmental and private organization are involved

2. Curriculum

2.1 Curriculum in disaster management

2.1.1

Not specified: not specified

Weak: Disaster education is slightly specified in the curriculum

Medium: Disaster education is specified at the subject of social science

Good: Disaster education is specified at several subject

Very good: Disaster education is specified with the cross-curricular perspective

2.1.2

Not incorporated: Not incorporated

Weak: 1-25% of the subjects incorporated

Medium: 26-50% of the subjects incorporated

Good: 51-75% of the subjects incorporated

Very good: 76-100% of the subjects incorporated

2.1.3

Not localized: Not localized

Weak: 1-25% of the subjects localized

Medium: 26-50% of the subjects localized

Good: 51-75% of the subjects localized

Very good: 76-100% of the subjects localized

2.1.4

Not assigned: No class hour

Weak: Less than 3 % of class hour

Medium: Approximately 4~6 % of class hour

Good: Approximately 7~9%

Very good: More than 10% of class hour

2.1.5

No involvement: No involvement of other stakeholders

Weak: 1-25% of educational and disaster related governmental and private organization are involved

Medium: 26%-50% of educational and disaster related governmental and private organization are involved

Good: 51%-75% of educational and disaster related governmental and private organization are involved

Very good: 76%-100% of educational and disaster related governmental and private organization are involved

2.2 Textbook

2.2.1

Not available: Not available

Weak: 1-25% % of the textbook referred

Medium: 26%-50% % of the textbook referred

Good: 51-75% % of the textbook referred

Very good: 76-100% % of the textbook referred

2.2.2

Not localized: Not localized

Weak: 1-25% of the contents localized

Medium: 26-50% of the contents localized

Good: 51-75% of the contents localized

Very good: 76-100% of the contents localized

2.2.3

60-69% of students are accessible

70-79% of students are accessible

80-89% of students are accessible

90-99% of students are accessible

100% of students are accessible

2.2.4

Not available: Not available

Weak: Approved by department of education but no institutional mechanism

Medium: There is mechanism and approved by internal body of department of education

Good: There is mechanism and checked by expert out of education department before approval

Very good: There is mechanism and approved by the body with the participation of expert out of education department.

2.3 Evaluation

2.3.1

Not available: Not available

Weak: 1-25% of the contents have goals referred to disaster management

Medium: 26-50% of the contents have goals referred to disaster management

Good: 51-75% of the contents have goals referred to disaster management

Very good: 76-100% of the contents have goals referred to disaster management

2.3.4

Not available: No institutional mechanism

Weak: 1-25% of the feedback is reflected

Medium: 26-50% of the feedback is reflected

Good: 51-75% of the feedback is reflected

Very good: 76-100% of the feedback is reflected

2.3.5

No involvement: No involvement of other stakeholders

Weak: 1-25% of educational and disaster related governmental and private organization are involved

Medium: 26%-50% of educational and disaster related governmental and private organization are involved

Good: 51%-75% of educational and disaster related governmental and private organization are involved

Very good: 76%-100% of educational and disaster related governmental and private organization are

involved

3 Co-curricular activities

3.1 Co-curricular activities

3.1.1

Not incorporated: Not incorporated

Weak: 1-25% of the activities incorporated

Medium: 26-50% of the activities incorporated

Good: 51-75% of the activities incorporated

Very good: 76-100% of the activities incorporated

3.1.4

Not customized: Not customized

Weak: 1-25% of the contents customized

Medium: 26-50% of the contents customized

Good: 51-75% of the contents customized

Very good: 76-100% of the contents customized

3.1.5

No involvement: No involvement of other stakeholders

Weak: 1-25% of educational and disaster related governmental and private organization are involved

Medium: 26%-50% of educational and disaster related governmental and private organization are involved

Good: 51%-75% of educational and disaster related governmental and private organization are involved

Very good: 76%-100% of educational and disaster related governmental and private organization are involved

3.2 Manual/Textbook

3.2.1

Not prepared: Not prepared

Weak: 1-25% of the contents on disaster management prepared

Medium: 26-50% of the contents on disaster management prepared

Good: 51-75% of the contents on disaster management prepared

Very good: 76-100% of the contents on disaster management prepared

3.2.2

Not customized: Not customized

Weak: 1-25% of the contents customized

Medium: 26-50% of the contents customized

Good: 51-75% of the contents customized

Very good: 76-100% of the contents customized

3.2.4

Not available: No equipment available

Weak: 1-25% of the co-curricular activities on disaster management is provided.

Medium: 26-50% of the co-curricular activities on disaster management is provided.

Good: 51-75% of the co-curricular activities on disaster management is provided.

Very good: 76-100% of the co-curricular activities on disaster management is provided.

3.2.5

No involvement: No involvement of other stakeholders

Weak: 1-25% of educational and disaster related governmental and private organization are involved

Medium: 26%-50% of educational and disaster related governmental and private organization are involved

Good: 51%-75% of educational and disaster related governmental and private organization are involved

Very good: 76%-100% of educational and disaster related governmental and private organization are involved

3.3 Evaluation

3.3.1

Not available: Not available

Weak: 1-25% of the contents have goals referred to disaster management

Medium: 26-50% of the contents have goals referred to disaster management

Good: 51-75% of the contents have goals referred to disaster management

Very good: 76-100% of the contents have goals referred to disaster management

3.3.4

Not available: No institutional mechanism

Weak: 1-25% of the feedback is reflected

Medium: 26-50% of the feedback is reflected

Good: 51-75% of the feedback is reflected

Very good: 76-100% of the feedback is reflected

3.3.5

No involvement: No involvement of other stakeholders

Weak: 1-25% of educational and disaster related governmental and private organization are involved

Medium: 26%-50% of educational and disaster related governmental and private organization are involved

Good: 51%-75% of educational and disaster related governmental and private organization are involved

Very good: 76%-100% of educational and disaster related governmental and private organization are involved

4. Teacher's training

4.1 Teacher's training

4.1.1

Not available: Not available

Weak: 1-25% teachers received training

Medium: 26%-50% teachers received training

Good: 51%-75% teachers received training

Very good: 76%-100% teachers received training

4.1.2

Not available: Not available

Weak: 1-25% of training have contents on disaster management

Medium: 26%-50% of training have contents on disaster management

Good: 51%-75% of training have contents on disaster management

Very good: 76%-100% of training have contents on disaster management

4.1.3

Not available: Not available

Weak: 1-25% of training have contents on school safety

Medium: 26%-50% of training have contents on school safety

Good: 51%-75% of training have contents on school safety

Very good: 76%-100% of training have contents on school safety

4.1.4

Not available: Trainers is not available

Weak: Undesignated trainers (chosen by occasion) are available

Medium: Designated trainers for disaster management who are not trained in disaster management

Good: Designated trainers for disaster management who are trained in disaster management by department of education

Very good: Designated trainers for disaster management who are trained in disaster management by department of disaster management

4.1.5

No involvement: No involvement of other stakeholders

Weak: 1-25% of educational and disaster related governmental and private organization are involved

Medium: 26%-50% of educational and disaster related governmental and private organization are involved

Good: 51%-75% of educational and disaster related governmental and private organization are involved

Very good: 76%-100% of educational and disaster related governmental and private organization are involved

4.2 Manual/Textbook

4.2.1

Not available: Not available

Weak: 1-25% of the contents on disaster management prepared

Medium: 26-50% of the contents on disaster management prepared

Good: 51-75% of the contents on disaster management prepared

Very good: 76-100% of the contents on disaster management prepared

4.2.2

Not localized: Not localized

Weak: 1-25% of the contents localized

Medium: 26-50% of the contents localized

Good: 51-75% of the contents localized

Very good: 76-100% of the contents localized

4.2.3

Not prepared: Not prepared

Weak: 1-25% of the manual/textbook prepared

Medium: 26-50% of the manual/textbook prepared

Good: 51-75% of the manual/textbook prepared

Very good: 76-100% of the manual/textbook prepared

4.2.4

Not included: not included

Weak: 1-25% of the manual/textbook on disaster management included

Medium: 26-50% of the manual/textbook on disaster management included

Good: 51-75% of the manual/textbook on disaster management included

Very good: 76-100% of the manual/textbook on disaster management included

4.2.5

No involvement: No involvement of other stakeholders

Weak: 1-25% of educational and disaster related governmental and private organization are involved

Medium: 26%-50% of educational and disaster related governmental and private organization are involved

Good: 51%-75% of educational and disaster related governmental and private organization are involved

Very good: 76%-100% of educational and disaster related governmental and private organization are involved

4.3 Evaluation

4.3.1

Not available: Not available

Weak: 1-25% of training have training goals on disaster management
Medium: 26-50% of training have training goals on disaster management
Good: 51-75% of training have training goals on disaster management
Very good: 76-100% of training have training goals on disaster management

4.3.2

Not available: No institutional mechanism
Weak: 1-25% of the feedback is reflected
Medium: 26-50% of the feedback is reflected
Good: 51-75% of the feedback is reflected
Very good: 76-100% of the feedback is reflected

4.3.5

No involvement: No involvement of other stakeholders
Weak: 1-25% of educational and disaster related governmental and private organization are involved
Medium: 26%-50% of educational and disaster related governmental and private organization are involved
Good: 51%-75% of educational and disaster related governmental and private organization are involved
Very good: 76%-100% of educational and disaster related governmental and private organization are involved

5. School building/facilities

5.1 Safety in School building

5.1.1

Not available: No design provided
Weak: 1-25% of safety norms applied
Medium: 26-50% of safety norms applied
Good: 51-75% of safety norms applied
Very good: 76-100% of safety norms applied

5.1.2

Not available: No institutional mechanism of supervision
Weak: There is institutional mechanism and engineer visit once in two week
Medium: There is institutional mechanism and engineer visit once in a week
Good: There is institutional mechanism and engineer visit once in a 2-3 days
Very good: There is institutional mechanism and engineer visit every day

5.1.3

Not available: No institutional mechanism
Weak: There is a institutional mechanism but no programme is conducted
Medium: There is a institutional mechanism and orientation of School Management Committee is

conducted

Good: There is a institutional mechanism and orientation, capacity building of School Management Committee is conducted

Very good: There is a institutional mechanism and orientation, capacity building of School Management Committee is conducted and written material is provided

5.1.4

Not available: No institutional mechanism of structural check

Weak: There is institutional mechanism and engineer visits school for structural check only when engineer is asked by school

Medium: There is institutional mechanism and engineer visits school for structural check less frequently than once in a 6 months

Good: There is institutional mechanism and engineer visits school for structural check as frequent as approximately once in a 2-4 months

Very good: There is institutional mechanism and engineer visits school for structural check more frequently than once in a month

5.2 School location

5.2.2-5.2.3

Not available: No norms available

Weak: 1-25% of safety norms applied

Medium: 26-50% of safety norms applied

Good: 51-75% of safety norms applied

Very good: 76-100% of safety norms applied

5.2.4

Not available: not conducted

Weak: Checked by the unspecialized (religious leader etc)

Medium: One of the geological or geographical aspect checked by the specialized person based on the norms/standard

Good: Both geological and geographical aspect checked by the specialized person based on the norms/standard

Very good: Both geological and geographical aspect checked by the specialized person not only based on the norms/standards, but also based on the individual site from safety perspective.

5.2.5

Not investigated: not investigated

Weak: 1-25% of school construction site investigated

Medium: 26-50% of school construction site investigated

Good: 51-75% of school construction site investigated

Very good: 76-100% of school construction site investigated

5.3 Safety in non-structural aspect

5.3.1

Not available: No safety norms available

Weak: 1-25% of safety norms applied

Medium: 26-50% of safety norms applied

Good: 51-75% of safety norms applied

Very good: 76-100% of safety norms applied

5.3.2

Not available: No monitoring mechanism

Weak: There is monitoring mechanism and checked once in a year

Medium: T There is monitoring mechanism and checked once in 6 months

Good: There is monitoring mechanism and checked once in each school term

Very good: There is monitoring mechanism and checked once more frequent than each school term

5.3.3

Not available: No monitoring mechanism

Weak: There is monitoring mechanism and checked once in a year

Medium: There is monitoring mechanism and checked once in 6 months

Good: There is monitoring mechanism and checked once in each school term

Very good: There is monitoring mechanism and checked once more frequent than each school term

5.3.4

Not available: Not available

Weak: There is institutional mechanism and conducted once in a year

Medium: There is institutional mechanism and conducted once in 6 months

Good: There is institutional mechanism and conducted once in each school term

Very good: There is institutional mechanism and it is available all the time.

5.3.5

Not available: Not available

Weak: 1-25% of schools required improvement are improved

Medium: 26-50% of schools required improvement are improved

Good: 51-75% of schools required improvement are improved

Very good: 76-100% of schools required improvement are improved

Appendix 12 Questionnaire survey format for non-formal education

Questionnaire Survey on institutionalization of disaster education for Non-formal education, State of Uttarakhand, India

This questionnaire aims to quantify the status of implementation of disaster education with focus on the institutional aspect in State of Uttarakhand. The following questions are mostly qualitative aspect and you are kindly asked to answer objectively based on act, document, report etc. All the response and date obtained from this questionnaire will be strictly used for academic research purpose. The findings from this survey are expected to contribute to promote effective practice of disaster education in Uttarakhand.

Thank you very much for your kind cooperation.

1. Education for School Children

Details of respondent

Full name: _____

Affiliation: _____

Phone: _____

Email: _____

Date when questionnaire was filled out: _____

1.1 Implementation

1.1.1 Programme is established based on political commitment/national and state policy

1. Not established	2. Weak	3. Medium	4. Good	5. Very good
-----------------------	------------	--------------	------------	-----------------

Reason of choice/Reference

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1.1.2 Introduction of various learning modality adopted (Interactive learning, experiential learning, active learning etc)

1. Not introduced	2. Weak	3. Medium	4. Good	5. Very good
----------------------	------------	--------------	------------	-----------------

Reason of choice/Reference

--

1.1.3 Contents of programme interconnect with the disaster education of school curriculum and school co-curricular activities

1. Not interconnected	2. Weak	3. Medium	4. Good	5. Very good
--------------------------	------------	--------------	------------	-----------------

Reason of choice/Reference

--

1.1.4 Programme component that conduct with the community participation

1. No component	2. Weak	3. Medium	4. Good	5. Very good
--------------------	------------	--------------	------------	-----------------

Reason of choice/Reference

--

1.1.5 Programme is conducted with the collaboration of multi-stakeholders

1. Not collaborated	2. Weak	3. Medium	4. Good	5. Very good
------------------------	------------	--------------	------------	-----------------

Reason of choice/Reference

--

1.2 Educational materials

1.2.1 Educational materials prepared for the programme component

1. Not available	2. Weak	3. Medium	4. Good	5. Very good
---------------------	------------	--------------	------------	-----------------

Reason of choice/Reference

--

1.2.2 Availability of various types of educational materials for one programme in average (poster, audio, visual, books)

1. Not available	2. Weak	3. Medium	4. Good	5. Very good
---------------------	------------	--------------	------------	-----------------

Reason of choice/Reference

--

1.2.3 Educational materials prepared in local context

1. Not available	2. Weak	3. Medium	4. Good	5. Very good
---------------------	------------	--------------	------------	-----------------

Reason of choice/Reference

--

1.2.4 Educational materials prepared in accordance with programme component

1. Not available	2. Weak	3. Medium	4. Good	5. Very good
---------------------	------------	--------------	------------	-----------------

Reason of choice/Reference

--

1.2.5 Educational materials is elaborated with the collaboration of multi-stakeholders

1. Not collaborated	2. Weak	3. Medium	4. Good	5. Very good
------------------------	------------	--------------	------------	-----------------

Reason of choice/Reference

--

1.3 Programme evaluation

1.3.1 Indicators/standards for evaluating achievement of programme

1. Not available	2. Weak	3. Medium	4. Good	5. Very good
---------------------	------------	--------------	------------	-----------------

Reason of choice/Reference

--

1.3.2 Mechanism to ensure sustainability of the effectiveness of programme after the programme ends

1. Not available	2. Weak	3. Medium	4. Good	5. Very good
---------------------	------------	--------------	------------	-----------------

Reason of choice/Reference

--

1.3.3 Mechanism of documentation (report, publication,) of the disaster education practice

1. Not available	2. Weak	3. Medium	4. Good	5. Very good
---------------------	------------	--------------	------------	-----------------

Reason of choice/Reference

--

1.3.4 Institutional mechanism of reflecting evaluation and achievement into next programme.

1. Not available	2. Weak	3. Medium	4. Good	5. Very good
---------------------	------------	--------------	------------	-----------------

Reason of choice/Reference

--

1.3.5 Collaboration of multi-stakeholders in evaluating the programme

1. No collaboration	2. Weak	3. Medium	4. Good	5. Very good
------------------------	------------	--------------	------------	-----------------

Reason of choice/Reference

--

2. Teacher's training

Details of respondent

Full name: _____

Affiliation: _____

Phone: _____

Email: _____

Date when questionnaire was filled out: _____

2.1 Implementation

2.1.1 Availability of teacher's training component among all disaster education related programme

1. Not available	2. Weak	3. Medium	4. Good	5. Very good
---------------------	------------	--------------	------------	-----------------

Reason of choice/Reference

--

2.1.2 Contents of teacher's training component is interconnected with school education (Curriculum, Co-curricular activities).

1. Not interconnected	2. Weak	3. Medium	4. Good	5. Very good
--------------------------	------------	--------------	------------	-----------------

Reason of choice/Reference

--

2.1.3 Coordination with education department

1. Not available	2. Weak	3. Medium	4. Good	5. Very good
---------------------	------------	--------------	------------	-----------------

Reason of choice/Reference

--

2.1.4 Trainer specialized in disaster management to provide training for teachers

1. Not available	2. Weak	3. Medium	4. Good	5. Very good
---------------------	------------	--------------	------------	-----------------

Reason of choice/Reference

--

2.1.5 Multi-stakeholders' collaboration in conducting the training

1. No collaboration	2. Weak	3. Medium	4. Good	5. Very good
------------------------	------------	--------------	------------	-----------------

Reason of choice/Reference

--

2.2 Educational materials

2.2.1 Educational materials for training programme

1. Not available	2. Weak	3. Medium	4. Good	5. Very good
---------------------	------------	--------------	------------	-----------------

Reason of choice/Reference

--

2.2.2 Educational materials are prepared in accordance with training programme contents

1. Not prepared	2. Weak	3. Medium	4. Good	5. Very good
--------------------	------------	--------------	------------	-----------------

Reason of choice/Reference

--

2.2.3 Manuals for teachers to conduct disaster education at individual schools is provided at training.

1. Not available	2. Weak	3. Medium	4. Good	5. Very good
---------------------	------------	--------------	------------	-----------------

Reason of choice/Reference

--

2.2.4 Educational materials prepared in local context

1. Not available	2. Weak	3. Medium	4. Good	5. Very good
---------------------	------------	--------------	------------	-----------------

Reason of choice/Reference

--

2.2.5 Educational materials is elaborated with the collaboration of multi-stakeholders.

1. Not collaborated	2. Weak	3. Medium	4. Good	5. Very good
------------------------	------------	--------------	------------	-----------------

Reason of choice/Reference

--

2.3 Evaluation

2.3.1 Indicators/standards for evaluating achievement of teacher's training programme/component

1. Not available	2. Weak	3. Medium	4. Good	5. Very good
---------------------	------------	--------------	------------	-----------------

Reason of choice/Reference

--

2.3.2 Mechanism of documentation (report, publication,) of the teacher's training

1. No available	2. Weak	3. Medium	4. Good	5. Very good
--------------------	------------	--------------	------------	-----------------

Reason of choice/Reference

--

2.3.3 Institutional mechanism of reflecting evaluation and achievement into next programme.

1. No available	2. Weak	3. Medium	4. Good	5. Very good
--------------------	------------	--------------	------------	-----------------

Reason of choice/Reference

--

2.3.4 Mechanism to share the achievement of teacher's training with department of education

1. No available	2. Weak	3. Medium	4. Good	5. Very good
--------------------	------------	--------------	------------	-----------------

Reason of choice/Reference

--

2.3.5 Collaboration with multi-stakeholders in evaluating the teacher's training

1. No collaboration	2. Weak	3. Medium	4. Good	5. Very good
------------------------	------------	--------------	------------	-----------------

Reason of choice/Reference

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3. Education for community

Details of respondent

Full name: _____

Affiliation: _____

Phone: _____

Email: _____

Date when questionnaire was filled out: _____

3.1 Establishment of community body

3.1.1 Component of establishment of community based organization on disaster management

1. Not available	2. Weak	3. Medium	4. Good	5. Very good
---------------------	------------	--------------	------------	-----------------

Reason of choice/Reference

--

3.1.2 Integration of the governmental guideline on community based disaster management (Village Disaster Management Committee)

1. Not integrated	2. Weak	3. Medium	4. Good	5. Very good
----------------------	------------	--------------	------------	-----------------

Reason of choice/Reference

--

3.1.3 Mechanism to promote the participation of various age-group and gender.

1. Not available	2. Weak	3. Medium	4. Good	5. Very good
---------------------	------------	--------------	------------	-----------------

Reason of choice/Reference

--

3.1.4 Mechanism to promote the participation of teachers into community based disaster organization on disaster management

1. Not available	2. Weak	3. Medium	4. Good	5. Very good
---------------------	------------	--------------	------------	-----------------

Reason of choice/Reference

--

3.1.5 Establishment is conducted with the collaboration of local government

1. No collaboration	2. Weak	3. Medium	4. Good	5. Very good
------------------------	------------	--------------	------------	-----------------

Reason of choice/Reference

--

3.2 Training and capacity building

3.2.1 Elaboration of community disaster management plan

1. Not elaborated	2. Weak	3. Medium	4. Good	5. Very good
----------------------	------------	--------------	------------	-----------------

Reason of choice/Reference

--

3.2.2 Component of orientation/awareness rising for established community organization

1. Not available	2. Weak	3. Medium	4. Good	5. Very good
---------------------	------------	--------------	------------	-----------------

Reason of choice/Reference

--

3.2.3 Training component for each task forces of established community body.

1. Not available	2. Weak	3. Medium	4. Good	5. Very good
---------------------	------------	--------------	------------	-----------------

Reason of choice/Reference

--

3.2.4 Component/activities to work with local school

1. Not available	2. Weak	3. Medium	4. Good	5. Very good
---------------------	------------	--------------	------------	-----------------

Reason of choice/Reference

--

3.2.5 Programme is conducted with the collaboration of multi-stakeholders

1. No collaboration	2. Weak	3. Medium	4. Good	5. Very good
------------------------	------------	--------------	------------	-----------------

Reason of choice/Reference

--

3.3 Evaluation

3.3.1 Indicators/standards for evaluating achievement of programme

1. Not available	2. Weak	3. Medium	4. Good	5. Very good
---------------------	------------	--------------	------------	-----------------

Reason of choice/Reference

--

3.3.2 Mechanism to ensure continuity (sustainability) of the effectiveness of programme after the programme ends

1. Not available	2. Weak	3. Medium	4. Good	5. Very good
---------------------	------------	--------------	------------	-----------------

Reason of choice/Reference

--

3.3.3 Mechanism of documentation (report, publication,) of the disaster education practice

1. Not available	2. Weak	3. Medium	4. Good	5. Very good
---------------------	------------	--------------	------------	-----------------

Reason of choice/Reference

--

3.3.4 Institutional mechanism of reflecting evaluation and achievement into next programme.

1. Not available	2. Weak	3. Medium	4. Good	5. Very good
---------------------	------------	--------------	------------	-----------------

Reason of choice/Reference

--

3.3.5 Collaboration of multi-stakeholders in evaluating the programme

1. No participation	2. Weak	3. Medium	4. Good	5. Very good
------------------------	------------	--------------	------------	-----------------

Reason of choice/Reference

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Thank you very much

Appendix 13 Explanation of each variable for non-formal education

Explanation of each variables for questionnaire survey

Non-formal education

<Definition of terms>

Programme: Programmes which is conducted by your organization such as National School Safety Programme, Awareness programme for school children in Dehradun etc.

Programme component: Programme component is the activities conducted under the programme such as muck drills, map making, lecture etc.

1. Education for School Children

1.1 Implementation

1.1.1 (DMMC)

Not established: Not established

Weak: 1-25% of programme component is established based on political commitment/national and state policy.

Medium: 26%-50% of programme component is established based on political commitment/national and state policy.

Good: 51%-75% of programme component is established based on political commitment/national and state policy.

Very good: 76%-100% of programme component is established based on political commitment/national and state policy.

1.1.2

Not available: Only classroom lecture adopted

Weak: One learning modalities besides classroom lecture adopted

Medium: Two learning modalities besides classroom lecture adopted

Good: Three learning modalities besides classroom lecture adopted

Very good: More than Four learning modalities besides classroom lecture adopted

1.1.3

Not interconnected: Not interconnected

Weak: 1-25% of programme component is interconnect with school curriculum

Medium: 26%-50% of programme component is interconnect with school curriculum

Good: 51%-75% of programme component is interconnect with school curriculum

Very good: 76%-100% of programme component is interconnect with school curriculum

1.1.4

No component: No component

Weak: 1-25% of programme component is conducted with the community participation

Medium: 26%-50% of programme component is interconnect with school curriculum

Good: 51%-75% of programme component is interconnect with school curriculum

Very good: 76%-100% of programme component is interconnect with school curriculum

1.1.5

Not collaborated: No other stakeholders collaborated

Weak: 1-25% of programme is conducted with collaboration of multi-stakeholders

Medium: 26%-50% of programme is conducted with collaboration of multi-stakeholders
Good: 51%-75% of programme is conducted with collaboration of multi-stakeholders

Very good: 76%-100% of programme is conducted with collaboration of multi-stakeholders

1.2 Educational materials

1.2.1

Not available: Not available

Weak: 1-25% of programme component has specific educational materials

Medium: 26%-50% of programme component has specific educational materials

Good: 51%-75% of programme component has specific educational materials

Very good: 76%-100% of programme component has specific educational materials

1.2.2

Not available: No educational materials

Weak: One educational materials prepared

Medium: Two educational materials prepared

Good: Three educational materials prepared

Very good: More than four educational materials prepared

1.2.3

Not available: No materials in local context

Weak: 1-25% of materials are localized

Medium: 26-50% of materials are localized

Good: 51-75% of materials are localized

Very good: 76-100% of materials are localized

1.2.4

Not available: Not prepared in accordance with programme component

Weak: 1-25% of educational materials prepared in accordance with programme component

Medium: 26%-50% of educational materials prepared in accordance with programme component

Good: 51%-75% of educational materials prepared in accordance with programme component
Very good: 76%-100% of educational materials prepared in accordance with programme component

1.2.5

Not collaborated: No other stakeholders collaborated

Weak: 1-25% of educational materials are elaborated with collaboration of multi-stakeholders

Medium: 26%-50% of educational materials are elaborated with collaboration of multi-stakeholders

Good: 51%-75% of educational materials are elaborated with collaboration of multi-stakeholders

Very good: 76%-100% of educational materials are elaborated with collaboration of multi-stakeholders

1.3 Evaluation

1.3.1

Not available: Not available

Weak: 1-25% of the programme have indicators/standards

Medium: 26-50% of the programme have indicators/standards

Good: 51-75% of the programme have indicators/standards

Very good: 76-100% of the programme have indicators/standards

1.3.2

Not available: no mechanism available

Weak: 1-25% of programme has the contents to enhance the sustainability and independence of target to keep them working in disaster management

Medium: 26-50% of programme has the contents to enhance the sustainability and independence of target to keep them working in disaster management

Good: 51-75% of programme has the contents to enhance the sustainability and independence of target to keep them working in disaster management

Very good: 76-100% of programme has the contents to enhance the sustainability and independence of target to keep them working in disaster management

1.3.3

Not available: No mechanism of documentation

Weak: 1-25% of programme are documented in some way

Medium: 26-50% of programme are documented in some way

Good: 51-75% of programme are documented in some way

Very good: 76-100% of programme are documented in some way

1.3.4

Not available: No mechanism of reflecting evaluation

Weak: There is mechanism and 1-25% of programme evaluation/achievement reflected

Medium: There is mechanism and 26%-50% of programme evaluation/achievement reflected

Good: There is mechanism and 51%-75% of programme evaluation/achievement reflected

Very good: There is mechanism and 76%-100% of programme evaluation/achievement reflected

1.3.5

No collaboration: No other stakeholders collaborated

Weak: 1-25% of programme evaluation implemented with collaboration of multi-stakeholders

Medium: 26%-50% of programme evaluation implemented with collaboration of multi-stakeholders

Good: 51%-75% of programme evaluation implemented with collaboration of multi-stakeholders

Very good: 76%-100% of programme evaluation implemented with collaboration of multi-stakeholders

2. Teacher's training

2.1 Implementation

2.1.1

Not available: No teachers training provided

Weak: 1-25% of programme has teacher's training component

Medium: 26-50% of programme has teacher's training component

Good: 51-75% of programme has teacher's training component

Very good: 76-100% of programme has teacher's training component

2.1.2

Not interconnected: Not interconnected

Weak: 1-25% of programme component is interconnect with school education

Medium: 26%-50% of programme component is interconnect with school education

Good: 51%-75% of programme component is interconnect with school education

Very good: 76%-100% of programme component is interconnect with school education

2.1.3

Not available: No coordination with education department

Weak: Coordination only for notification to teachers

Medium: Coordination for planning the contents of teacher's training

Good: Coordination for planning and evaluation of teacher's training

Very good: Coordination for planning and evaluation of teacher's training and participation of personnel of education department to teacher's training

2.1.4

Not available: Trainers is not available

Weak: Undesignated trainers (chosen by occasion) are available

Medium: Designated trainers who are not trained in disaster management

Good: Designated trainers who are trained in disaster management

Very good: Designated trainers who are trained in disaster management with academic degree related to

disaster management

2.1.5

No collaboration: No other stakeholders collaborated

Weak: 1-25% of teacher's training implemented with collaboration of multi-stakeholders

Medium: 26%-50% of teacher's training implemented with collaboration of multi-stakeholders

Good: 51%-75% of teacher's training implemented with collaboration of multi-stakeholders

Very good: 76%-100% of teacher's training implemented with collaboration of multi-stakeholders

2.2 Educational materials

2.2.1

Not available: No educational materials

Weak: 1-25% of the educational materials prepared out of all training contents

Medium: 26-50% of the educational materials prepared out of all training contents

Good: 51-75% of the educational materials prepared out of all training contents

Very good: 76-100% of the educational materials prepared out of all training contents

2.2.2

Not prepared: Not prepared

Weak: 1-25% of the educational materials prepared in accordance with training programme

Medium: 26-50% of the educational materials prepared in accordance with training programme

Good: 51-75% of the educational materials prepared in accordance with training programme

Very good: 76-100% of the educational materials prepared in accordance with training programme

2.2.3

Not available: no manuals available for teachers

Weak: 1-25% of training provides manuals

Medium: 26-50% of training provides manuals

Good: 51-75% of training provides manuals

Very good: 76-100% of training provides manuals

2.2.4

Not available: No materials in local context

Weak: 1-25% of materials are localized

Medium: 26-50% of materials are localized

Good: 51-75% of materials are localized

Very good: 76-100% of materials are localized

2.2.5

No collaboration: No other stakeholders collaborated

Weak: 1-25% of educational materials elaborated with collaboration of multi-stakeholders
Medium: 26%-50% of educational materials elaborated with collaboration of multi-stakeholders
Good: 51%-75% of educational materials elaborated with collaboration of multi-stakeholders
Very good: 76%-100% of educational materials elaborated with collaboration of multi-stakeholders

2.3 Evaluation

2.3.1

Not available: Not available

Weak: 1-25% of the programme/component have indicators/standards

Medium: 26-50% of the programme/component have indicators/standards

Good: 51-75% of the programme/component have indicators/standards

Very good: 76-100% of the programme/component have indicators/standards

2.3.2

Not available: No mechanism of documentation

Weak: 1-25% of programme are documented in some way

Medium: 26-50% of programme are documented in some way

Good: 51-75% of programme are documented in some way

Very good: 76-100% of programme are documented in some way

2.3.3

Not available: No mechanism of reflecting evaluation

Weak: There is mechanism and 1-25% of programme evaluation/achievement reflected

Medium: There is mechanism and 26%-50% of programme evaluation/achievement reflected
Good: There is mechanism and 51%-75% of programme evaluation/achievement reflected

Very good: There is mechanism and 76%-100% of programme evaluation/achievement reflected

2.3.4

Not available: No mechanism of sharing achievement with department of education

Weak: There is mechanism and 1-25% of teacher's training evaluation/achievement shared

Medium: There is mechanism and 26%-50% of teacher's training evaluation/achievement shared

Good: There is mechanism and 51%-75% of teacher's training evaluation/achievement shared

Very good: There is mechanism and 76%-100% of teacher's training evaluation/achievement shared

2.3.5

No collaboration: No other stakeholders collaborated

Weak: 1-25% of teacher's training evaluation implemented with collaboration of multi-stakeholders

Medium: 26%-50% of teacher's training evaluation implemented with collaboration of multi-stakeholders

Good: 51%-75% of teacher's training evaluation implemented with collaboration of multi-stakeholders

Very good: 76%-100% of teacher's training evaluation implemented with collaboration of

multi-stakeholders

3. Education for community

3.1 Establishment of community body

3.1.1

Not available: No component

Weak: 1-25% of programme has the component out of all the component on disaster management conducted by the organization

Medium: 26-50% of programme has the component out of all the component on disaster management conducted by the organization

Good: 51-75% of programme has the component out of all the component on disaster management conducted by the organization

Very good: 76-100% of programme has the component out of all the component on disaster management conducted by the organization

3.1.2

Not integrated: Not integrated

Weak: 1-25% of guideline is integrated

Medium: 26-50% of guideline is integrated

Good: 51-75% of guideline is integrated

Very good: 76-100% of guideline is integrated

3.1.3

Not available: No mechanism

Weak: 1-25% of established organization has participation of youth and woman

Medium: 26-50% of established organization has participation of youth and woman Good: 51-75% of established organization has participation of youth and woman

Very good: 76-100% of established organization has participation of youth and woman

3.1.4

Not available: No mechanism

Weak: 1-25% of established organization has participation of teachers

Medium: 26-50% of established organization has participation of teachers

Good: 51-75% of established organization has participation of teachers

Very good: 76-100% of established organization has participation of teachers

3.1.5

No collaboration: Local government is not collaborated

Weak: 1-25% of establishment is conducted with the collaboration of local government

Medium: 26%-50% of establishment is conducted with the collaboration of local government

Good: 51%-75% of establishment is conducted with the collaboration of local government

Very good: 76%-100% of establishment is conducted with the collaboration of local government

3.2 Training and capacity building

3.2.1

Not elaborated: Not elaborated

Weak: 1-25% of established organization has elaborated

Medium: 26-50% of established organization has elaborated

Good: 51-75% of established organization has elaborated

Very good: 76-100% of established organization has elaborated

3.2.2

Not available: No component

Weak: 1-25% of programme of education for community has the component

Medium: 26-50% of programme of education for community has the component

Good: 51-75% of programme of education for community has the component

Very good: 76-100% of programme of education for community has the component

3.2.3

Not available: No component

Weak: 1-25% of programme of education for community has the component

Medium: 26-50% of programme of education for community has the component

Good: 51-75% of programme of education for community has the component

Very good: 76-100% of programme of education for community has the component

3.2.4

Not available: No component/activities

Weak: 1-25% of programme of education for community has component/activities with local school

Medium: 26-50% of programme of education for community has component/activities with local school

Good: 51-75% of programme of education for community has component/activities with local school

Very good: 76-100% of programme of education for community has component/activities with local school

3.2.5

No collaboration: No other stakeholders collaborated

Weak: 1-25% of the programme is conducted with collaboration of multi-stakeholders

Medium: 26%-50% of the programme is conducted with collaboration of multi-stakeholders

Good: 51%-75% of the programme is conducted with collaboration of multi-stakeholders

Very good: 76%-100% of the programme is conducted with collaboration of multi-stakeholders

3.3 Evaluation

3.3.1

Not available: Not available

Weak: 1-25% of the programme have indicators/standards

Medium: 26-50% of the programme have indicators/standards

Good: 51-75% of the programme have indicators/standards

Very good: 76-100% of the programme have indicators/standards

3.3.2

Not available: no mechanism available

Weak: 1-25% of programme has the contents to enhance the sustainability and independence of target to keep them working in disaster management

Medium: 26-50% of programme has the contents to enhance the sustainability and independence of target to keep them working in disaster management

Good: 51-75% of programme has the contents to enhance the sustainability and independence of target to keep them working in disaster management

Very good: 76-100% of programme has the contents to enhance the sustainability and independence of target to keep them working in disaster management

3.3.3

Not available: No mechanism of documentation

Weak: 1-25% of programme are documented in some way

Medium: 26-50% of programme are documented in some way

Good: 51-75% of programme are documented in some way

Very good: 76-100% of programme are documented in some way

3.3.4

Not available: No mechanism of reflecting evaluation

Weak: There is mechanism and 1-25% of programme evaluation/achievement reflected

Medium: There is mechanism and 26%-50% of programme evaluation/achievement reflected

Good: There is mechanism and 51%-75% of programme evaluation/achievement reflected

Very good: There is mechanism and 76%-100% of programme evaluation/achievement reflected

3.3.5

No collaboration: No other stakeholders collaborated

Weak: 1-25% of programme evaluation implemented with collaboration of multi-stakeholders

Medium: 26%-50% of programme evaluation implemented with collaboration of multi-stakeholders

Good: 51%-75% of programme evaluation implemented with collaboration of multi-stakeholders

Very good: 76%-100% of programme evaluation implemented with collaboration of multi-stakeholders

Appendix 14 Questionnaire survey format for informal education (student)

Questionnaire Survey on institutionalization of disaster education for Informal education, State of Uttarakhand, India

This questionnaire is to ask about the degree of exposure to disaster related information in daily life such as flood, landslide, earthquake etc. All the response and date obtained from this questionnaire will be strictly used for academic research purpose.

Thank you very much for your kind cooperation.

1. About Media

Details of respondent

Class : _____ Male Female

Date when questionnaire was filled out: _____

1.1 Social networking service (WhatsApp, twitter, Facebook etc)

1.1.1 Do you see the news/article about disaster on social network service (WhatsApp, twitter, Facebook etc)?

1. Never	2. Seldom	3. Sometimes	4. Often	5. Usually
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1.1.2 Do you obtain the warnings of disaster from social network service (WhatsApp, twitter, Facebook etc)?

1. Never	2. Seldom	3. Sometimes	4. Often	5. Usually
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1.1.3 Do you obtain the information on do's and don'ts against natural disaster from social network service (WhatsApp, twitter, Facebook etc)?

1. Never	2. Seldom	3. Sometimes	4. Often	5. Usually
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1.1.4 Do you share the news/articles about disaster on social network service (WhatsApp, twitter, Facebook etc)?

1. Never	2. Seldom	3. Sometimes	4. Often	5. Usually
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1.1.5 Do you share the information on do's and don'ts of natural disaster on social network service (WhatsApp, twitter, Facebook etc)?

1. Never	2. Seldom	3. Sometimes	4. Often	5. Usually
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1.2 About Digital media (Internet)

1.2.1 How often do you see the weather forecast on internet (Internet news site, Web site of Meteorological Agency)?

1. Never	2. Seldom	3. Sometimes	4. Often	5. Usually
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1.2.2 Do you read the article on internet about disaster experience of the area you live?

1. Never	2. Seldom	3. Sometimes	4. Often	5. Usually
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1.2.3 Do you see the news on disaster (scale, number of victims, area, damage etc) on internet (Internet News, Web page of Disaster Management Authority) ?

1. Never	2. Seldom	3. Sometimes	4. Often	5. Usually
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1.2.4 Do you obtain the warnings of disaster from internet (Internet News, Web page of Disaster Management Authority)?

1. Never	2. Seldom	3. Sometimes	4. Often	5. Usually
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1.2.5 Do you obtain the information on do's and don'ts of natural disaster from internet (Internet News, Web page of Disaster Management Authority) ?

1. Never	2. Seldom	3. Sometimes	4. Often	5. Usually
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1.3 Mass media (TV, Radio, Newspaper)

1.3.1 How often do you see the weather forecast on TV, Radio and Newspaper?

1. Never	2. Seldom	3. Sometimes	4. Often	5. Usually
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1.3.2 Do you watch/read the article on TV, Radio and Newspaper about disaster experience?

1. Never	2. Seldom	3. Sometimes	4. Often	5. Usually
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1.3.3 Do you see the news on disaster (scale, number of victims, area, damage etc) from TV, Radio and Newspaper?

1. Never	2. Seldom	3. Sometimes	4. Often	5. Usually
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1.3.4 Do you obtain the warnings of disaster from TV, Radio and Newspaper?

1. Never	2. Seldom	3. Sometimes	4. Often	5. Usually
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1.3.5 Do you obtain the information on do's and don'ts of natural disaster from TV, Radio and Newspaper?

1. Never	2. Seldom	3. Sometimes	4. Often	5. Usually
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2. Family

2.1 Conversation on disaster

2.1.1 How often do you and your family have a conversation about the possible occurrence of disaster?

1. Never	2. Less than once in 6 months	3. Once in 4-5 months	4. Once in 2-3 months	5. More than every month
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2.1.2 How often do you and your family have the conversation of how to react during disaster such as do's and don'ts?

1. Never	2. Less than once in 6 months	3. Once in 4-5 months	4. Once in 2-3 months	5. More than every month
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2.1.3 Do your family including you talk and prepare for the family disaster kit which contains the items needed to survive during and soon after disasters? Examples of kit contents are followings.

Examples of kit contents

A set of warm cloths	Dry food items and drinking water	Important documents
Batteries, Torch	First aid box	Medicines
Blanket or pillow	Other items that you need to think take	

1. Never talked	2. Talked but not prepared	3. Prepared but not discussed the needs among your family	4. Prepared based on considering the needs among your family	5. Prepared based on considering the needs among your family with backpack
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2.1.4 Do your family including you talk and decide evacuation route for case of disaster?

1. Never talked	2. Talked but not decided	3. Talked and decided 1 route	4. Talked and decided 2 routes	5. Talked and decided more than 2 routes depends on disaster type
--------------------	------------------------------	----------------------------------	-----------------------------------	--

2.1.5 Do your family talk and decide the way to contact among your family member in case that you become separated from family during disaster?

1. Never talked	2. Talked but not decided	3. Talked and decided one way	4. Talked and decided two ways	5. Talked and decided more than 2 ways depends on disaster type
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2.2 Sharing of disaster experience

2.2.1 How often do you listen to the earthquake experience of your family members?

1. Never	2. Less than once in 6 months	3. Once in 4-5 months	4. Once in 2-3 months	5. More than every month
-------------	----------------------------------	--------------------------	--------------------------	-----------------------------

2.2.2 How often do you listen to the flood experience of your family members?

1. Never	2. Less than once in 6 months	3. Once in 4-5 months	4. Once in 2-3 months	5. More than every month
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2.2.3 How often do you listen to the landslide seen or experienced by your family members?

1. Never	2. Less than once in 6 months	3. Once in 4-5 months	4. Once in 2-3 months	5. More than every month
-------------	----------------------------------	--------------------------	--------------------------	-----------------------------

2.2.4 How often do you talk to your family members about the disaster experience that your acquaintance had?

1. Never	2. Less than once in 6 months	3. Once in 4-5 months	4. Once in 2-3 months	5. More than every month
-------------	----------------------------------	--------------------------	--------------------------	-----------------------------

2.2.5 When you listen to the disaster experience from your family members, the experience is told including do's and don'ts for disasters?

1. Never	2. Less than once in 6 months	3. Once in 4-5 months	4. Once in 2-3 months	5. More than every month
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2.3 School learnings into home

2.3.1 Do you talk to your family members what you learned at the class of school?

1. Never	2. Seldom	3. Sometimes	4. Often	5. Usually
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2.3.2 Do you talk to your family members what you learned about disaster management at class in school?

1. Never	2. Seldom	3. Sometimes	4. Often	5. Usually
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2.3.3 Do you talk to your family members what you learned on first aid and search and rescue through school activities (NCC, NSS, Scout and Guide, other school activities)

1. Never	2. Seldom	3. Sometimes	4. Often	5. Usually
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2.3.4 Do you teach to your family members what you have learned about first aid and search and rescue at home?

1. Never	2. Seldom	3. Sometimes	4. Often	5. Usually
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2.3.5 Do you apply what you have learned at school on disaster management for your home (for some preparedness)?

1. Not applied	2. Seldom	3. Sometimes	4. Often	5. Usually
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Thank you very much

Appendix 15 Questionnaire survey format for informal education (community)

Questionnaire Survey on institutionalization of disaster education for Informal education, State of Uttarakhand, India

This questionnaire is to ask about the degree of exposure to disaster related information in daily life such as flood, landslide, earthquake etc. All the response and date obtained from this questionnaire will be strictly used for academic research purpose.

Thank you very much for your kind cooperation.

1. About Community

Details of respondent

Full name: _____

Community: _____

Date when questionnaire was filled out: _____

1.1 Community linkage

1.1.1 Frequency of village level meeting?

1. Never	2. Less than 3 times a year	3. 4-5 times a year	4. 7-8 times a year	5. More than 10 times a year
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1.1.2 Availability of opportunity to participate in the activities of community (such as clean-up project, recreation programme)

1. Never	2. Less than 3 times a year	3. 4-5 times a year	4. 7-8 times a year	5. More than 10 times a year
-------------	-----------------------------------	------------------------	------------------------	------------------------------------

1.1.3 Availability of opportunity to be involved in the activities of community based group (volunteer group, group for woman empowerment)

1. Never	2. Less than 3 times a year	3. 4-5 times a year	4. 7-8 times a year	5. More than 10 times a year
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1.1.4 Availability of opportunity to be involved in the religious group activities at your community

1. Never	2. Less than 3 times a year	3. 4-5 times a year	4. 7-8 times a year	5. More than 10 times a year
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1.1.5 Availability of opportunity for community people to attend the activities of local school?
(Independence Day event, sports competition, cultural competition)

1. Never	2. Less than 3 times a year	3. 4-5 times a year	4. 7-8 times a year	5. More than 10 times a year
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1.2 Disaster experience

1.2.1 Your village has experienced the flood that induced structural damage before?

1. Never	2. Less than once in 15 years	3. Once in 10-15 years	4. Once in 5-10 years	5. More than once in 5 years
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1.2.2 Your community has experienced the earthquake that bring structural damage before?

1. Never	2. Less than once in 15 years	3. Once in 10-15 years	4. Once in 5-10 years	5. More than once in 5 years
-------------	-------------------------------------	------------------------------	-----------------------------	------------------------------------

1.2.3 Your community has experienced the landslide that bring structural damage before?

1. Never	2. Less than once in 15 years	3. Once in 10-15 years	4. Once in 5-10 years	5. More than once in 5 years
-------------	-------------------------------------	------------------------------	-----------------------------	------------------------------------

1.2.4 Your community has experienced the drought?

1. Never	2. Less than once in 15 years	3. Once in 10-15 years	4. Once in 5-10 years	5. More than once in 5 years
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1.2.5 Your community has experienced the natural disaster that caused human loss?

1. Never	2. Less than once in 15 years	3. Once in 10-15 years	4. Once in 5-10 years	5. More than once in 5 years
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1.3 Local knowledge

1.3.1 Old saying to predict heavy rainfall at your village

1. No saying	2. 1-25% of villagers know	3. 26-50% of villagers know	4. 51-75% of villagers know	5. 76-100% of villagers know
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What is the saying?

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1.3.2 Old saying to predict the occurrence of earthquake at your village

1. No saying	2. 1-25% of villagers know	3. 26-50% of villagers know	4. 51-75% of villagers know	5. 76-100% of villagers know
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What is the saying?

1.3.3 Rituals to prevent the occurrence of natural disaster at your village

1. No rituals	2. 1-25% of villagers know	3. 26-50% of villagers know	4. 51-75% of villagers know	5. 76-100% of villagers know
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What is the rituals?

1.3.4 Storytelling/folklore about the past natural disaster at your village

1. No storytelling/folklore	2. 1-25% of villagers know	3. 26-50% of villagers know	4. 51-75% of villagers know	5. 76-100% of villagers know
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What is the storytelling/folklore?

1.3.5 There is a traditional way of construction to mitigate the damage of natural disaster at your village

1. No traditional way of construction	2. 1-25% of construction adopted	3. 26-50% of construction adopted	4. 51-75% of construction adopted	5. 76-100% of construction adopted
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Reason of choice/Reference

Thank you very much

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