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Investigating Disaster Risk Reduction Management Competencies among Pre-Service Students: A Qualitative Study in Tertiary Education in Zimbabwe

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Abstract

Widespread studies have demonstrated the importance of integrating disaster risk reduction management into the school curriculum. Such curricula provide for a continuous and multi-disciplinary process of planning and implementation of measures aimed at reducing the risk of disasters, mitigating the severity and consequences of disasters, emergency preparedness, and post-disaster recovery and rehabilitation. Drawing on the Sendai Framework for Disaster Risk Reduction 2015-2030, the study explores the disaster risk reduction competencies among pre-service students in secondary school teacher training colleges in Zimbabwe. The study adopted a case study design within a qualitative approach. Twelve student-teacher subject representatives and four lecturers were purposively selected to participate in the focus group discussions and interviews respectively. To achieve triangulation subjects' syllabi documents, the students' lecture notes and handouts were also content analysed into emergent themes. The findings revealed that disaster risk reduction knowledge was most prevalent in preservice teachers taking certain subject areas and not others. However, instruction in these subjects concentrated on knowledge acquisition largely leaving out other competence areas such as skills, attitudes, and values for disaster risk reduction education. Further findings suggest the need for a systematic and deliberate disaster risk reduction competence-based integration and expansion of current syllabi to include geographic information systems, indigenous knowledge, and community engagement. The study

recommends teacher education curricula review to align existing syllabi content to current and emerging trends in disaster risk reduction competencies.

Keywords: *Disaster preparedness, risk reduction, surrogate experiential, field experiential*

Introduction

Due to climate change phenomena, the number of disasters that are occurring around the world is exacerbated (Shamano, 2010; Nifa et al., 2018). Every year there are millions of people inflicted with disasters such as severe weather conditions, drought, floods and diseases (International Strategy for Disaster Reduction [IDSDR], 2009). People are killed or displaced because of the effects of the disasters (Arcaya et al., 2020). Like many other countries Zimbabwe continues to experience natural hazards such as severe cyclones, droughts and floods (Munsaka et al., 2021). It has therefore been predicted that cyclone-induced flooding is one such common and devastating phenomena causing nearly half of all natural hazards (Mhlanga et al., 2019: Rana & Routray, 2018). Such hazards are expected to surge both in frequency and intensity because of the climatic change phenomenon.

Some disasters occurring due to the effects of climate change, such as cyclone Idai in Zimbabwe, brought about huge devastation and displacement of individuals and communities. (Chapungu, 2020). The devastation caused by Cyclone Idai exposed capacity and policy gaps in Zimbabwe's disaster risk management system (Munsaka et al., 2021). After the cyclone the country's disaster preparedness and post disaster recovery and rehabilitation, across all sectors of government including education, came into question. Thus, like elsewhere in developing countries, the magnitude of this disaster exposed the deficiencies in the national and local disaster risk management and preparedness (Munsaka et al., 2021).

Several definitions of disaster have emerged in literature. However, some scholars view it as a severe disruption of the operations of a community or society that inflicts widespread human, material, economic or environmental losses exceeding the ability of the affected community to cope using its own resources (ISDR, 2009). While natural or some man-

made disasters cannot be prevented, communities can plan in advance for such eventualities through disaster management involving preparedness and mitigation measures (UNESCO, 2010). According to Mutasa and Coetzee (2019), to prevent huge devastation and create sustainable and disaster resistant societies, schools and colleges can play a pivotal role. Poor involvement on the part of any stakeholders and the low level of community awareness of management of natural disasters might lead to severe adverse short- and long-term impacts on the community as a whole. Disaster management implies addressing the underlying social, economic and environmental vulnerabilities thereby reducing the risk of disasters occurring (Shamano, 2010).

The young generation and youths of school going age need to be involved the disaster risk reduction planning and implementation process in order to mitigate the severity and consequences of disasters. Young people have crucial roles to play in perspectives adjustments, and push for positive reforms in areas such as policy and accountability, and mind-set change from focusing on disaster response to investing in disaster preparedness (UNISDR 2009). Ronan et al. (2001) aver that disaster risk reduction management education programmes can help young people achieve increased awareness, realistic risk perceptions and greater acquisition of competences related to risk mitigation and home-based hazard adjustment. Competences for disaster risk reduction education here means sets of knowledge, skills, attitudes, experiences and values learners require in order to be aware of and prepare themselves for future eventual disasters. These competences for disaster risk reduction (DRR) in education form a crucial aspect of curricula that is central to disaster resilience building (Nifa et al., 2018). If the psychological and the physical awareness and preparedness strategies, packaged as learning competences, were practiced and learnt by people who live around the disaster prone areas, the damage caused by such disasters would have minimal devastating effects (Grothmann & Reusswig, 2006).

With the increasing of natural hazards within countries, people must increase, enhance and learn about DRR in order to build disaster resilience and develop a sustainable environment for a better future (Nifa et al., 2018). Every country has made DRR education a top priority due to the terrible effects of many disasters around the world (Lapada, 2022).

Colleges of education can play a pivotal role in disaster risk reduction by crafting and implementing a comprehensive and efficient DRR programme (Arcaya et al., 2019). Effects of disaster can be reduced if all people are well informed and motivated towards a culture of disaster risk reduction and resilience at all levels (Mamogale, 2011). Therefore, preservice teachers taught about DRR can protect themselves and in turn pass information to their students. UNISDR (Mavhura et al., 2017) state that learners that are DRR aware can pass on to their parents what they have learnt about hazards and risk reduction.

DRR activities in Zimbabwe were found to be predominantly focused on response instead of a focus on creating and enforcing mitigation measures (Mudavanhu & Bongo, 2015; Mavhura et al., 2017). Zimbabwe's disaster management system is more reactive than proactive. This applies to both slow to rapid onset or natural to human-induced disasters. This unfortunate scenario invokes questions on how nations can become more proactive than reactive. In South Africa, for instance, disaster management is regarded a multi-disciplinary continuous process that brings together synergies from various sectors of the government in planning and implementation of measures aimed at: preventing or reducing the risk of disasters, mitigating the severity and consequences of disasters, emergency preparedness, a rapid and effective response to disasters and post disaster recovery and rehabilitation (South African Disaster Management Act, 2002). Proactive disaster preparedness plans are largely dependent on a diverse and multi-sectoral approach including the involvement of schools and learners. (Patkus & Walpole, 2007). Equipping students with the requisite knowledge and skills on DRR measures for these unexpected phenomena could be both life-changing and life-saving. People, who have a developed sense of DRR awareness and were taught about natural hazard risk in school, play an important role in saving lives and protecting members of the community at a time of disaster (Lapada, 2022; Mamogale, 2011).

A study conducted in Zimbabwe by Munsaka etal. (2021) found notable strides in meeting the 2020 target, where the country is required to come up with comprehensive national and sub-national disaster risk strategies aligned to the Sendai Framework for Disaster Risk Reduction 2015–2030. It is however not clear yet if these reported strides have filtered through to

school and college curricula. The current study therefore sought to establish college students' competences about DRR, and ways of improving DRR knowledge among students.

Statement of the Problem

Natural disasters have become a common feature the world over. These are destroying lives and property. Teaching of DRR to all preservice student teachers enables them to teach school learners to prevent themselves from natural hazards by knowing exactly what to do when there is an outbreak. A curriculum devoid of DRR learning competences results in societies deprived of information that assists on resilience, preparedness and sustainability. Achievement of disaster preparedness by educators is critical, and can be achieved through an integration of disaster education in the national curriculum, teaching and learning as well as assessment (Mamogale, 2011).

Research Objectives

The study sought to:

1. Establish students' competences about DRR education in colleges.
2. Suggest strategies for improving DRR competences among students.

Literature Review

Theoretical framework

The study draws on the Sendai Framework for Disaster Risk Reduction (SFDRR) 2015-2030, a strategy adopted at the 3rd UN Conference in Sendai, Japan in 2015. Building on an earlier instrument, the Hyogo Framework for Action 2005-2015 the conference's major goal was to:

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 that prevent and reduce hazard exposure and vulnerability to disaster, increase preparedness for response and recovery, and thus strengthen resilience. (UNISDR, 2015 p. 9)

Central to the achievement of this ensuing goal the SFDRR has the following as some of its major target activities: need for nations to conceptualise disaster risk and its diversity, identify the nature of and characteristics of hazards and vulnerability, accountability for disaster risk

management, mobilisation of communities and resources to create resilience and preparedness, recognition of stakeholders, strengthening of global partnership, development of resilience-informed policies, strengthening policy coherence for sectoral coordination and periodic monitoring of early warning signs (UNISDR, 2015). Respective countries and their institutions have to integrate these into their disaster risk reduction (DRR) policy initiatives.

Emerging discourses from the conference directed towards a shift from disaster management to a strong emphasis on disaster risk management with the latter focusing more on preparedness and awareness as opposed to wait to manage disasters after their occurrence. Recent guidelines delineated from the SFDRR have further shifted focus to local DRR and resilience to tie localisation of DRR to Sustainable Development Goals (Parajuli, 2020).

This latest development identifies knowledge as a defining factor to the success of the SFDRR goals. Parajuli (2020) observe that a number of epistemic areas inclusive of disaster risk perception, disaster risk awareness, preparedness, response and recovery at both institutional and community levels stand out. In other words, knowledge areas are considered under two major parts of DRR, that is, risk assessment encompassing disaster risk perception and early warning under preparedness and awareness (Parajuli, 2020). For both Parajuli (2020 p. 2) argues that: "Knowledge is the key component which informs decision-making when reducing risk and improving preparedness in the pre-disaster phase, and also when enhancing perception, reaction and response during and post-disaster". Thus it is mandatory that individuals, institutions, and communities are knowledgeable at three levels- disaster mitigation and preparedness (pre-disaster), disaster occurrence (during the disaster) and recovery and rehabilitation (post-disaster). Knowledge factors considered under the three include components such as overall response and recovery, multi-hazard resilient structures, codes and guidelines, land use plan, reaction expectations, hazard mapping, preventive measures, vulnerability assessment, first aid and immediate safety guidelines and interventions (Parajuli, 2020; Khan et al., 2008).

Integrating DRR competences into school curricula

There is a growing body of literature defining DRR concepts. These concepts represent diverse but interrelated knowledge areas. Words and phrases such as hazard, disaster, risk, danger, vulnerability, capacity or lack of it are found to be associated with the topic. Bringing the words together in a definition Khan et al. (2008) say a disaster results from the hazardous effects of natural or man-made calamities on a population whose vulnerability is high and capacity or measures to reduce the potential chances of risk is insufficient or greatly reduced. "A disaster happens when a hazard impacts on the vulnerable population and causes damage, casualties and disruption" (Khan et al., 2008 p. 44). This study adopts Palliyaguru's et al. (2014) definition of vulnerability in which the concept is viewed as having four components- risk, resilience, susceptibility, and resistance.

Physical environments are prone to risk exposure depending on their proximity to geological, environmental, physical, chemical, biological, water, and climatic hazards wherein some social environments are susceptible to vulnerability "...owing to cultural, economic, political, and social forces and activities that determine the proneness of individuals and groups to the adverse effects of a disaster" (Palliyaguru et al. 2014 p. 49). The other two terms, resistance and resilient denote physical environments that are able to resist the impacts of disasters and cope with or make quick recovery from disasters respectively. Thus, drawing on the four components the authors define vulnerability as a combination of factors imposing risks to life, livelihood, property and asserts by discrete and identifiable events. By that conceptualisation vulnerability imposes itself as cross-cutting eventualities of human life coming in various forms- political, cultural, socially, technological, economical and physical- that the school curriculum cannot manage to ignore. Thus, integration of DRR forms of knowledge become a must for all educational institutions.

Bringing on DRR knowledge into the school curriculum is gaining momentum in most institution of learning worldwide. It is only recently that nations now see the importance of DRR knowledge building and dissemination among citizens (Parajuli, 2020). The trend that seem to emerge in literature is that countries that experience frequent disasters such as Philippine are at the forefront of this DRR curriculum knowledge

integration movement. Cabalio-Valencia et al. (2019) aver that because Philippine regularly experiences the brunt of hazards and is trapped in recurrent cycles of disaster, dislodgement and reconstruction DRR discourse and knowledge certainly becomes a relevant part of the school curriculum. Writing on DRR knowledge of grade 11 students in the Philippine Mamon et al. (2017 p. 70) say:

With the provisions of DRR management Act, comprehensive, and integrated knowledge building about disaster education is intensified among students under the K-12 Education Program. The youth are empowered to be proactive members of community on DRR and sustainable development. It is relevant and significant to assess the capacity of students on DRR to ensure that the senior high school education of the K-12 curriculum is substantial on the culture of safety and resilience toward disaster risks.

Thus, in Philippine country national policies are augmented by international laws on DRR to offer integration possibilities at all levels of education, from basic to tertiary (Cabalio-Valencia et al., 2019).

Other disaster-prone countries such as Bangladesh, Cambodia, Indonesia and Pakistan have ensured effective coordination of policy frameworks on DRR, built capacity of teachers and made efforts to democratise the knowledge base of DRR education (Kagawa & Selby, 2014). Despite variations in implementation challenges, commonalities of strategy of the four countries on DRR curriculum development include; main streaming DRR topics and themes in textbook across subjects, curriculum localisation and DRR community outreach programmes, teacher capacity development on DRR knowledge and teaching approaches, and project-based case studies of learners' involvement in safe schools'/community resilience-building initiatives.

Diverse researcher focus is observed on studies to do with DRR knowledge and the school curriculum. With some studies focusing on particular countries approaches to DRR curriculum development others have illuminated learning theories that can assist knowledge building in DRR yet others have dwelt on tools and gaming for DRR education. Kitagawa (2021) studied disaster risk reduction activities the teaching and learning. The study links five major learning perspectives, namely: cognitivism, behaviourism, social cognitive theory, cognitive constructivism and social

constructivism, with specific risk reduction activities. Kitagawa (2021) concluded that engagement with learning theories aids understanding on how people's acquisition of values and attitudes associated with resilience. Tuladhar et al. (2014) investigated prevalence of DRR knowledge among 124 students from schools located in 17 districts of Nepal. Like in the current study, the focus of the interview questions was on DRR knowledge areas such as disaster risk perception, readiness, awareness and adaptation. Parajuli (2020) highlights challenges and gaps of implementing DRR in science education in developing countries.

The paper emphasises the need for public awareness through citizenship disaster education that helps reduce exposure, improves preparedness and reaction to disasters. In their study of schools in Ghana Apronti et al. (2015) explore the existence of DRR within the syllabi of the school curriculum comparing the findings with teachers' perspectives on actual implementation. The findings confirm the existence of the seemingly perennial theory-praxis gap debate. While the curriculum documents endevoured interactive and novel techniques for teaching, learning and evaluation of DRR lessons, significant gaps manifested when it came to practical application of the techniques in the classrooms (Apronti et al., 2015). A common recommendation emerging from some of these studies on DRR knowledge is the need for further research in the area and an escalation of DRR competences integration in education in order to contribute meaningfully to the achievement of the SFDRR goals and framework for action as articulated in its 2015-2030 vision.

Methodology

The study adopted a case study design within a qualitative approach. Burns and Grove (2003 p. 19) describe a qualitative approach as "a systematic subjective approach used to describe life experiences and situations to give them meaning". Thus, in qualitative research interpretation of the social world is premised on the meanings and shared understanding held by individuals or groups of people. Qualitative approach therefore allowed participants' subjective experiences, voices, feelings and understanding to be heard (Burns & Grove, 2003).

The study sample consisted of 16 participants, twelve student teacher subject representatives and four lecturers. Purposive sampling was used to

identify the student teachers who participated in a focus group discussion (FGD) and the lecturers who were interviewed. Following Cohen et al. (2013) suggestions, the researchers ensured focus group homogeneity of different subject areas in order to generate data from diverse sub-groups of the student population. Interview questions for lecturers sought to assess what DRR competences they endeavoured to impart and the strategies they thought would be employed to further enhance student learning in the area. In order to achieve triangulation document analysis was also used. Documents such as the subject syllabi, students' lecture notes and other related materials were analysed to establish deliberate development of any knowledge, skills and values on DRR. The data generated was content analysed. The strict and systematic procedures in content analysis as postulated in Cohen et al. (2013) assisted the researchers come up with patterns, codes and replicable and valid inferences that were used to generate themes for reporting the findings.

Findings

Students' Competencies on DRR.

Students revealed that got DRR information from different subject areas in the college. The table below shows the subjects on offer at the college.

Table 1

Subjects offered at the tertiary institution

Course Model and Duration	Subject Category	Subject
Post 'A' Level- 2 Year Course	Academic Study	Mathematics, Geography and Environmental Studies (GES), Chishona, English, Computer Science, Commerce, Economics, Accounts, Religious Studies, Physical Education, Sport & Mass Display

Post 'O' Level- 3 Year Course	Academic Study	Science (Biology; Physics; Chemistry), Physical Education, Sport & Mass Display, Art, Design & Technology, Music, Food Technology, Clothing, Textiles Design & Technology, Building Studies and Agriculture.
College-Wide Courses (Done by both Post 'A' & Post 'O' teacher candidates)	Professional Studies	Profession Studies Syllabus "A" and "B"
	Educational Foundations	Psychology, Sociology, Philosophy, Educational Management and Curriculum Study

The table shows that different academic subjects are offered under different course models except for Physical Education, Sport and Mass Displays which can be offered under both the Post 'A' Level preservice teachers or Post 'O' Level. In the former preservice teachers have two or passes at Advance Level in subject combinations they want to specialize in while in the latter preservice teachers have at least five 'O' Level subject passes. Preservice teachers from both models study Professional Studies (PS) and Foundations of Education (FoE). Six sections that constitute the Syllabus "A' are General Teaching Methods, Educational Technology, Classroom Management (Communications), Research Methods, Family Health & Life Studies (FHLS) and Inclusive Education (IE). Syllabus "B" is Specific Teaching Methods of each Academic Subject.

The findings revealed that DRR knowledge was most prevalent in preservice teachers in certain subject areas and not the others. The subject areas that had outstanding knowledge on DRR were: Building Studies, Science, GES, Agriculture and Physical Education, Sport & Mass Displays. Building students revealed that they were repairing infrastructure that was destroyed during a cyclone in order to minimize danger on the college community. It was also revealed that building students were also constructing drainages so that all water is properly drained. It was further

noted that the building students were constructing humps to reduce accidents among the visually impaired students. Showing of his rehabilitation skills after a disaster Student Teacher 5 made the following remarks in the focus group discussion:

I have learnt a lot about DRR. In my subject area there are so many activities we do to reduce disasters in college. Soon after a cyclone that hit and destroyed infra- structure, we repaired roofs. We also have some students who are visually impaired. To reduce accidents as they move, we erected ramps for them. Now they are able to move safely with their walking sticks. We are even renovating old structures to reduce danger. We are everywhere in the college making repairs and constructing new buildings to reduce accidents.

It was also established from the interviews that there were some DRR activities done in the Science department. The lecturers revealed that as soon as student teachers entered the science lab they were taught first aid and laboratory rules and regulations to reduce lab accidents. To alleviate effects of disasters, it was also revealed that students were taught to use all their senses to detect if there was any danger in the surrounding areas. Lecturer 1 remarked:

In my subject area, the Health and Life Skills we induct all students who come to train at this college, they are all taught first aid techniques and general safety rules and regulations to reduce various accidents that can happen in the college premises.

Another, Lecturer 3 added:
Students are also taught to use their senses: sight, smell, hearing and feeling. Students should be told never to use their sense of taste for chemicals found in the laboratory for obvious reasons.

However, data from the documents showed a pattern inconsistent with what the lecturers said in the interviews. For instance, the Mathematics, Computer Science, Biology, Physics, Chemistry, Accounts, Commerce and English syllabi had nothing in the form knowledge, skills or values that related to DRR. The preservice teachers from the same subject area seemed blank during the group discussions.

The study found out that the Geography and Environmental Studies (GES) had installed a weather station that was useful in weather forecasts. In the weather station it was revealed that student's teachers took readings, recorded and predicted weather outcomes. In the FDG the GES students intimated that they were are taught about different hazards and how to respond to the hazards. The GES syllabus (preamble) elaborates as follows:

The range of the topics, concepts and activities contained in the syllabus needs an informed, holistic response to a lifelong process that develops skills, attitudes and values that are necessary for appropriate environmental management and sustainable development.

This was followed up by content indicating coverage of the related topics and concepts such as: developments in Geography; developments in Environmental Studies; nature of environmental issues, problems and crises; environment impact assessment; responses to environmental issues, processes and crises such as; environmental policy, legislation and institutional framework at local, regional and global levels, nature of global climatic change, weather hazards related to climatic change such as droughts, floods, cyclones and related concepts on Environmental Education. While GES provided a convincing alignment with disaster risk management concepts and principles, not all students do GES. This means that most concepts of DRR do not reach all students because they are not covered in all subject areas of the college curriculum

Overall most of the students were aware of DRR. The media (social, mass, print), internet and some contemporary studies were a source of the DRR knowledge. For instance, topics such as environmental sustainability and stress and stress management were studied in FHLS and Educational Psychology. The college had installed wi- fi in all hostels so that students can access any information they wanted including information on DRR. Moreover, newspapers were supplied every day and were available in the library. Staff and students could also get updated information about disasters. The occurrence of the cyclone (Cyclone Idai) was itself a major source of DRR knowledge. The news about the cyclone was experienced first-hand in two ways. First, the college infrastructure (the dining hall and the computer laboratory) was damaged. Second, some students and staff at the college had relatives who lived in the eye of the cyclone (in

Chimanimani) who were victims. Furthermore, the social, mass and print media was awash with incidents and stories narrating the trail of destruction left by the cyclone.

Strategies for improving DRR competences among students

While students mentioned that they got factual information on DRR but wanted more information on how to react when different disasters occur and how they can help others. They also revealed that they wanted to know more about the early warning systems of different disasters. It meant most of the knowledge students centred around disaster occurrence, recovery and rehabilitation. They had limited knowledge on disaster mitigation and preparedness. For instance, it emerged that there were fire extinguishers in most buildings but very few students knew how to use them in case of a fire outbreak. Furthermore, students revealed that they were not sure of where to assemble in case of an emergence due to a disaster. They mentioned that there was no serene in the college to even alert them in case of any disaster. Therefore, in the event of a hazard the students were not aware of any reaction plan.

In order to fill such gaps in knowledge on DRR the participants made a number of suggestions. The following came out from the interviews with lecturers and FGDs with the student teachers:

- Respondents suggested that DRR be taught as a module so that students get similar information. For that to happen it was suggested that a module on DRR was to be produced by lecturers.
- Respondents suggested that there was need for a clear communication plan and clear steps to take during a disaster
- In preparation for some disasters, it was suggested that drills be done for an example, on how to use fire extinguishers in case of a fire outbreak in hostels and other buildings.
- It was also suggested that college should partner with safety partners such as people from civil protection unit should be invited to assist in training of students and staff.
- It was also suggested that the college develops a crisis response team that provides regular practices and trainings on DRR among other things.

- Awareness campaigns including commemoration of the International Day for Disaster Reduction should be done.

Further suggestions pointed to the need for systematic study of DRR competences through deliberate infusion of the concepts into the curriculum. The lecturers seemed to suggest that DRR education mainly focused on knowledge acquisition leaving out skills, attitudes and values related to the topic area. Lecturer 3 reflected:

You find out that DRR knowledge is just coming out now because we have just had a disaster in Chimanimani. But no one ever thought it would come. And if you see the way it is treated in the college curriculum you will see that it comes haphazardly and not planned for in some systematic way that gives the learners information on the preparedness for such disasters

Despite this perceived and exclusive focus on DRR knowledge, some lecturers thought the knowledge aspect was not covered adequately. Lecturer 2 held this view:

I teach Chishona. And my worry is that today's knowledge on disasters does not take into account the early warning signs that are provided for in our traditions and culture as vaShona. For instance, back then our elders would know that when certain fruits occur in abundance it meant a drought or a bumper harvest. Or that a year of scanty rainfall is preceded by a very cold winter. It would therefore mean that when we teach about disasters without invoking knowledge and values from our culture we will never get the full picture

Lecturer 1 added:
While you may want to believe that GES covers the issues on DRR comprehensively there are other areas that lack. For instance, the inclusion of Geographical Information Systems (GIS) in that syllabus will go a long way to strengthen student teachers' DRR IT skills and knowledge

Data from the focus group discussion and documents analysis seemed to corroborate the finding that there was limited deliberate development of DRR skills, values and attitudes. Besides some information and knowledge on DRR concepts the syllabi and students' lecture notes did not go beyond to suggest student learning activities that

promoted skills and values development that assist students' accountability for disaster risk management, mobilisation of communities and resources to create resilience and preparedness, including coordination and periodic monitoring of early warning signs. One student, Student Teacher 3, explained:

I think the college can create opportunities for field trips to Chimanimani and Chipinge to see for ourselves the destruction that was caused by Cyclone Idai. I believe seeing for yourself does more than just learning about these DRR concepts.

Student Teacher 7 reflected:
The other way to strengthen our knowledge on DRR is to invite those who have experienced the cyclones or survivors to come tell us their experiences so that we understand their emotions and we listen to their suggestions on future preparedness or invite resource persons from the Meteorological Department of Civil Protection Unit to come and provide us with more information.

Another one, Student Teacher 11 added:
In our subject area, I am majoring in Mathematics, we do not have much of these issues on DRR competences but am not sure if this knowledge cannot also be infused in Mathematics. Or in the college-wide courses (PS and FOE) maybe these issues could be discussed in greater detail.

The quotes seem to suggest systematic and deliberate DRR competences integration that is inclusive of indigenous knowledge systems (IKs), community engagement and across-sectors collaboration, DRR value systems, information technology and geographical information systems.

Discussion

This study assessed DRR competences at three levels- disaster mitigation and preparedness (pre-disaster), disaster occurrence (during the disaster) and recovery and rehabilitation (post-disaster). One of the major finding of the study was prevalence of knowledge only at two levels, that is, during and post disaster. The finding means that the preservice student teachers were mainly aware of such aspects such as overall response and recovery, first aid and immediate safety guidelines and interventions and were

ignorant of crucial aspects highlighted by Parajuli (2020). These aspects such as multi-hazard resilient structures, codes and guidelines, land use plan, reaction expectations, hazard mapping, preventive measures and the accompanying skills and values are vital for disaster mitigation and preparedness. The absence of knowledge on pre-disaster stages such as developing of preventive laws and regulations, training response personnel, and establishing zoning requirements was a limitation. Literature (Abid et al. 2021; Parajuli, 2020) highlights the importance of the disaster management cycle disaster mitigation and preparedness, disaster occurrence and recovery and rehabilitation to government, agency organizations, civic societies and communities to build resilience.

The study also revealed the prevalence of substantial DRRM knowledge amongst the preservice student teachers. The majority of them became aware of disaster trends and vocabulary because of a cyclone (Idai) that had just occurred. Mutasa and Coetzee (2019) found similar results. They made the observations that despite the slow rate of integration of DRR competences there was considerable knowledge of disaster risk reduction terminology among teachers in public schools in Botswana. In this study the GES preservice student teachers were found to possess much more substantial knowledge on DRR than the rest of the students while the Building Studies student teachers were very practical and engaging in rehabilitation activities. By its nature, the GES content that is inclusive of topics such as landforms, climate, climate change, plate tectonics, earthquakes, floods fosters DRR terminology. Similar observations have been made elsewhere. In Cambodia disaster risk reduction has been mainstreamed in the grade 8 Geography and Earth Studies curriculum using the dedicated subject approach. According to this approach a few subjects from the entire curriculum are designated to introduce DRR concepts with the likelihood of excluding other learners specializing in other subject areas or those dropping out of school from DRR studies (Apronti et al., 2015; Kagawa & Selby, 2014; Nahayo et al. 2018).

Another emerging theme from the study was the need to integrate DRR competences into the entire college curriculum. This finding meant adopting inclusive curriculum and pedagogical integration approaches that bring other academic areas such as Mathematics, Chishona, English, Computer Science, Commerce, Economics, Accounts, Religious Studies

and Physical Education, Sport & Mass Display on board. Literature (Apronti, et al. 2015; Gong, 2021; Kagawa & Selby, 2014; Kalogiannidis et al., 2022; Mutasa & Coetzee, 2019; is replete with such approaches that increase DRR knowledge access to all students in the school or college.

Drawing on syllabus content analysis like the current study Apronti et al. (2015) observe the use of the infusionist approach as opposed to the dedicated subject approach in Ghana education system. The infusionist approach confines learning outcomes to knowledge acquisition rather than development of skills, attitudes and values needed for lifelong learning and disaster preparedness, management and response (Apronti et al., 2015). Citing Kagawe and Selby's (2014, criticism of the infusionist approach, Apronti et al., 2015 p. 9179) say:

Activities such as safety and evacuation drills, community hazard mapping, demonstrations of appropriate disaster response scenarios and disaster simulation games are often not utilized. Even when these practical sessions are undertaken, they are often completed too quickly, and various important aspects are neglected. Despite this criticism the approach is credited for its use of DRR related crosscutting themes, integration that can be implemented in situations that require quick dissemination of DRR knowledge and achievement of positive integration results without big changes to syllabi or introduction of new modules (Apronti et al., 2015).

The respondents in this study suggested other ways to integrate DRR competences. Field trips, resource persons and use of IT applications were among the pedagogical approaches advocated for. For instance, in other jurisdictions artificial intelligence systems and geospatial technology have been used to plot the spatial dispersal of flood hazards and their occurrence (Abid, et al., 2021). Inclusion of such IT systems into school subjects (e.g GES and Computer Science) can be a useful integration tool for DRR knowledge co-production and community engagement (Abid et al., 2021; Canevari-Luzardo et al., 2015).

Similar approaches have been suggested in other studies elsewhere (see e.g, Selby and Kagawa, 2012). Effective disaster preparedness, management and response require involvement of entire sectors across the community- cluster coordinators, sector coordination groups, and education or technical staff (Kalogiannidis et al., 2022). Writing about

Greece civil protection Kalogiannidis et al. (2022) further alludes to the importance of the triadic missions of citizens' life and health property, society and cultural heritage, and country's resources, assets and natural environment. According to this argument the schools' system plays the interconnecting role of a significant social institution together with the family and community that shape and influencing the people's views, DRR knowledge and actions. The same argument therefore becomes the contextual basis for calling on the need for DRR competences integration through engagement with community, civil protection unit and other technical or cultural resource persons. Such integration can perhaps be executed through what Kagawa and Selby (2012, as cited in Apronti et al., 2015) call teaching and learning techniques for DRR. The teaching and learning techniques for DRR enshrine six approaches- interactive (brainstorm and discuss DRR topics), surrogate experiential (use of real life events), field experiential (engage in practical activities outside the school), affective (sharing feelings and experiences on disaster events), inquiry (engage in scientific and internet inquiry) and action (active involvement in practical actions and sessions).

Conclusion

While there are different knowledge sources for DRR such as social media, mass media, research studies and communities it emerged that the school curriculum can be a vital source of DRR knowledge generation and dissemination. Preservice students in this study displayed some DRR competences covering the SFDRR's last two of the three knowledge areas: pre- disaster, during disaster and post -disaster. Participants thought that it was vital that the college expand the integration of DRR competences into the curriculum to equip all students with more or less the same sets of DRR knowledge, skills, abilities, values and experiences. Further engagement with communities and other sectors of the government such as CPU on activities aimed at disaster awareness, perception, preparedness, recovery, resilience and rehabilitation was vital. This qualitative study was done at one tertiary institution in Zimbabwe. While many insights on DRR competences can be deduced from the study the results cannot be generalized to all tertiary institutions.

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