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Inclusivity in online and distance disaster education: A review of educators' views

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ABSTRACT

Future exemplary education should foster inclusive and respectful learning environments to meet new challenges like digital inequality and power concentration. In the new normal of education due to COVID-19, inclusive online disaster risk reduction (DRR) education is essential. Therefore, this article aims to investigate the current status quo of inclusive online and distance DRR education and its benefits. Expert interviews were conducted with 40 educators with experience in 13 countries. The experts were selected based on their experience in designing and/or delivering courses/modules related to disaster management and/or disaster risk reduction at the tertiary level. The interview questions covered 3 key aspects i.e., 1. the effectiveness of online delivery methods, 2. the status quo of online and distant DRR education and 3. the unique benefits of online education for DRR. The key findings suggest that an online setting works best when it is scientifically designed for the right audience, the right subject area, and the right mix. In creating inclusivity in DRR education, the digital divide needs to be acknowledged and interactive learning should be diversely designed. This study identifies gaps in digital disaster education, urging policy and practice changes to support diverse DRR communities beyond education providers and recipients.

1. Introduction

Encompassing a broad range of learning and teaching activities in diverse settings disaster education (also known as Disaster Risk Reduction [DRR] education) is becoming increasingly popular in light of the growing complexities of hazards and disasters. However, as with all others, the continuity of DRR education too has significantly changed with the emergency shift from conventional education to an online setting [32]. Following the largest disruption of education systems of all time recorded, i.e. COVID-19 pandemic, approximately 1.6 billion learners in over 190 countries were affected [43] and the devastating effects were worse for the learners from vulnerable communities/ contexts. While disaster education was largely promoted in disaster-prone countries and regions, by means of 'education of and for disasters' [23], the changes to education in the post-pandemic era resulted in inequalities in education in general in such contexts. In other words with the distinctive rise of e-learning and remote DRR education activities, learners from vulnerable contexts were left with competing priorities and had to face several unprecedented challenges which resulted in inclusive education and social equity becoming abstract phenomena in that time of pandemic crisis [2]. For instance, 46% of the learning population remained offline from the world [47]. This attracted the world's attention to promoting the inclusivity of online education to endure in the new normal. Inclusivity or inclusion in education refers to equal opportunities to receive education and every learner learning on the same footing as others [42]. However, the often underrepresented

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student groups with less access to education, especially higher education, due to their personal and external problems and hence competing priorities become more overwhelmed following extreme events resulting in them being less resilient [44]. Therefore, as a sub-discipline in the field of education, the inclusivity of digital disaster education is vital as it is the excluded groups of people that benefit most from the receival of disaster education. Hence, this research aims to address the research gap to review the inclusivity in online and distance disaster education. To achieve the aim, the research consists of 3 key objectives, i.e., to review the experience of educators (education providers) and their experience with regard to the effectiveness of digital DRR education and online delivery methods, the status quo of online and distant DRR education and unique benefits of online education for DRR.

2. Research methodology

As an initial step in determining the employed research methods for this study, the research problem was adequately established, followed by a literature review. As a research conducted to review the current inclusivity aspects in online and distance disaster education, this study is undertaken as a qualitative empirical research to capture explicit expert knowledge. The research gap necessitated an explorative analysis of experts' opinions in the forms of descriptive data. Accordingly, the study aims to answer several research questions, including how effective online and distance education is for disaster risk reduction (DRR). It also explores why online and distance education is beneficial to the DRR discipline. Additionally, it addresses an ontological research question, seeking to understand the status quo of online and distant DRR education. According to Denscombe [8], expert interviews are apposite when in-depth and in detail exploration of complex research phenomena through the experts' experiences feelings, judgments and emotions can be done. In light of their key role, this study reviews the views of educators who teach, are involved in administrative tasks, and design digital disaster education at the tertiary level including short cycle programmes, undergraduate studies, postgraduate studies, doctoral studies and professional education/training (i.e. lifelong learning, continuous professional development, research, and international cooperation [examples: international curricula, joint degrees, international innovation projects, and the exchange of students, staff, and knowledge]). The samples of expert respondents were selected using the purposive sampling approach and snowballing method. Singh and Masuku [36] argued purposive sampling as a fitting method to reach the purpose of a study as it shortlists the most knowledgeable respondents in a research area. Collected data was analysed manually using a content analysis method identifying the key themes of analysed data. The interview guideline was developed based on the themes recognised in the initial literature review. Hence, in terms of the data analysis, the process was initiated with deductive coding where the initial (predefined) codes were developed as per the main themes of the interview structure. Thereafter, inductive coding was used to perceive possible codes emerging (inductively) when scrutinizing meanings in the collected data. Accordingly, the analysis was sorted and structured. Interviewers (researchers) have worked collaboratively to develop an inter-coder agreement. According to Skjott Linneberg and Korsgaard [37], researchers working independently on thematic analysis and coding in collaboration allow producing joint interpretations showcasing greater dimensionality.

2.1. About the interviewees

All the interviewees for this study have been practising their profession mainly in higher education and are research active as well. Interviewees have been selected on the understanding that DRR is a multidisciplinary study and if an academician is research active in the DRR discipline, their insights, and perspective on the overall teaching (given that it involves DRR elements) reflect on good competency evidence and make the expert eligible as an interviewee for the study. While some interviewees have experience teaching international students, in international contexts, unless otherwise asked their experience mainly reflects the current context they are based in. Interviews were conducted across different universities in the 4 countries (i.e., United Kingdom, Japan, Sweden, and Lithuania) and further extended to explore the perspectives of educators from different other countries like Sri Lanka, Thailand, Australia, Bangladesh, China, India, Indonesia, Japan, Philippines, etc. Therefore, the above sample mainly is a representation of educators from 4 countries, i.e., the United Kingdom, Japan, Sweden, and Lithuania, but is not limited to. The exceptions and special remarks are indicated in the results and discussion section. Table 1 in the appendices is a summary of the details of the participants in this study.

3. Literature review

3.1. Digital DRR education

While training on Disaster Risk Reduction (DRR) takes place in non-formal settings especially aiming at local communities, DRR learning activities have not been developed to link to a more comprehensive educational model [10]. According to Shaw et al. [33], behavioural change is the ultimate goal in DRR education. DRR education has generally been understood as experience-based, action-oriented learning, with the school serving as a central learning hub [34]. Apart from the disaster education offered through the school curriculum, below are the other ways it is delivered [6,23].

- Diploma level programmes
- Undergraduate level programmes
- Graduate-level programmes
- Certificate/training programmes/ workshops/seminars (ex: for the training of volunteer forces) offered by universities
- Training courses/ workshops/ seminar offered by disaster related institutes (ex: training courses conducted by Asian Disaster Preparedness Centre (ADPC) and Asian Disaster Reduction Centre (ADRC))

Other than the listed above, is lifelong learning through different informal modes of education [6,23]. All of the above can come under remote pedagogy with their own limitations. Online/Remote pedagogy in DRR, in this study, is understood as the DRR related teaching and learning performed at a distance and online in a formal study context, or more precisely through the schools or universities or institute based courses. Experience-based and action-oriented learning cannot fall under remote pedagogy. Similar to the changes that took place in other disciplines, the COVID-19 pandemic has encouraged reflecting on multiple, complex and cascading hazards and their implications for DRR education [32]. However, from the literature review done for this study, it can be argued that research to conceptualise 'digital disaster education' in online and remote education is minimal.

3.2. Key digital education terminologies and online teaching delivery methods/ approaches in DRR

When describing the learning environment, online, e-Learning and web-based have interchangeable definitions [27]. According to Albrahim [1], many scientific publications describe online learning using terminologies like e-learning, internet learning, virtual learning, web-based learning, web facilitated learning, computer-based learning, cyberlearning, distributed learning, resource-based learning and distance learning. According to Conrad [7], the term distant learning evolved to describe different forms of learning such as e-learning, online learning, online collaborative learning, mediated learning, web-based learning, virtual learning, etc., and most of these terminologies share commonalities in delivering the instructions (between the parties, instructor and the learner) that take place at different times/ places

using various forms of instructional materials. For instance, while there are ongoing arguments to distinguish the unique characteristics in these terminologies, the most repeated and widely accepted definitions of e-learning and online learning are comparable. *E*-learning is a strategy that employs (new) electronic media for a selection of learning/teaching purposes that range from the substitution of supplementary functions in traditional classrooms to in-person meetings, via the internet [15]. Synonymously online learning can be described as learning experiences that take place in synchronous or asynchronous environments with internet access using different devices such as mobile phones, desktops, laptops, etc. [9]. The term cybergogy was derived from this new learning and teaching concept in education pedagogy developed with the use of ICT (Information and Communication Technology) [39].

Despite online and distance learning becoming a necessity to sustain education following the COVID-19 outbreak, it allowed for flexibility. This flexibility facilitated comfortable learning to several group of students, especially those who had mobility difficulties. In light of the pros and cons of online learning, blended learning pedagogy became popular. While the definition of blended learning is still open for interpretation [18], the pedagogical concept of blended learning could be understood as a methodical combination of classroom-based and online-based instruction that stimulates and supports learning [3,4]. Sumarmi et al. [38] brought in a few examples of applications of blended learning from disaster management courses and also argued the importance e-modules as the right choice to better deliver disaster management learning materials. Mackey et al. [25] described blended learning as an approach that ensures academic resilience while Mustolikh et al. [28] concluded the improvements to students' character environment with blended learning strategy implementation on disaster mitigation learning. Some other examples of blended learning application in DRR education include implementation in emergency airway management training [22] and in training the public health workforce in emergency preparedness [26].

The concepts of synchronous and asynchronous learning environments are commonly described based on the type of interactions associated with the learning process [17]. For instance, in the synchronous learning environment, real-time interactions can be seen between the learners and the educators where the learners attend live lectures and obtain instant feedback/ response. Alternatively, in the asynchronous learning environments, usually, the learning content is available at different learning systems and forums and not available in the form of live classes/ lectures [5]. In other words, the synchronous learning environment is more structured compared to the asynchronous learning environment and has opposite advantages and disadvantages [24]. For instance, real time interactions can be helpful to instantly clarify matters, especially when learning new topics. Whereas reusability of learning content at students' own pace is more appropriate in self-learning and in-depth learning. Synchronous and asynchronous learning was widely seen in the post-COVID education era by means of emergency remote education, emergency remote learning, crisis education, etc. [12,14].

There is also an active learning pedagogical method that integrates synchronous (ex: by conducting classroom sessions to facilitate interactive discussions and perform higher-order learning activities including problem-solving) with asynchronous learning strategies (ex: by uploading pre-recorded lectures, module assignments, videos, quizzes, etc. online), which is referred to as online Flipped Class Rooms (FCRs) [31].

Open Educational Resources and Open-Source Software are fairly new concepts developed as part of the more well-known trend towards openness in higher education including Open Access. Open Educational Resources are known as digitised materials offered openly and freely (without any technical/legal/cost barriers and restrictions) for learners, and to use and re-use for learning, teaching and research purposes [19]. The open-access concept has also evolved through the development of phenomena like Massive Open Online Courses where there are freely available educational online courses aiming at a larger number of learners to participate in, simultaneously [45]. There are a number of MOOCs in the field of DRR conducted by private education providers as well as organisations such as the United Nations and The United Nations Educational, Scientific and Cultural Organisation (UNESCO).

The findings of the literature review on online teaching delivery methods/ approaches in DRR education suggested 5 key approaches as follows.

- Only Synchronous Learning
- Only Asynchronous Learning
- Online Flipped Class Rooms (FCRs)
- Blended learning
- Massive Open Online Courses

4. Results and discussion

The analysed interview data are structured under 3 main topics, 1) educators' experience and their evaluation of the effectiveness of online delivery methods; 2) the status quo of online and distant DRR education; and 3) the unique benefits of online education for DRR.

4.1. Educators' experience and their evaluation of the effectiveness of online delivery methods

All the interviewees were familiar with online teaching in general. This in fact reiterates the notion of [48] on the necessity of keeping pace with new approaches/methods of teaching during an era that demands online teaching due to societal changes. While MOOCs have become the least popular pedagogical approach among the interviewees, blended learning has become the most commonly used approach in the current context with higher education returning to normal following university closure due to the COVID outbreak and subsequent lockdowns. The pedagogical concept of blended learning could be understood as a methodical combination of classroom-based and online-based instruction that accommodates learning [3,4].

In regard to the effectiveness of the above online approaches, experts argued in support of and opposed each method. The effectiveness of the above approaches depends on when they are applied. Educators' perception of effectiveness, benefits, and drawbacks reflected feedback they received from students. Besides, the interviewees did not provide a definition or a standard interpretation of what effectiveness means for them and that might indicate a lack of experience with some of the methods, also reflected through the reluctance to respond to summing up the effectiveness, especially for students. As per Tartavulea et al. [40], it might be quite early for a full assessment of the effectiveness of online education and the interviewees' lack of input towards a standard interpretation of effectiveness reiterates this stance.

Some experts who compared the online setting with the onsite setting in commenting about the effectiveness felt that they are unable to teach the same things using online learning as they would face-to-face, particularly when considering the use of equipment. Yet, they also stressed that, in situations where a face-to-face session is not possible, it is better to have an online session than it would be to lose that session completely. Moreover, some have found that courses or materials which are specifically designed for teaching online are more effective than those which are adapted from face-to-face learning. They further stated that online learning can be very good for disseminating information but is less effective for encouraging students to discuss important matters.

Efficiency sometimes was defined as a combination of interaction-integrative features of teaching and inclusivity, the capacity to reach a broader group of people as well as enhance the learning experience by more easily integrating guest lectures by practitioners in an online setting while achieving a high degree of interaction. In such situations, the effectiveness of blended learning was highlighted. Contrary to that, a Swedish educator had a completely different approach to online

education, pointing out the benefits and the "tremendous" potential that online education for DRR holds when done properly and with passion. At the same time, they pointed out that at some point there is a need to reconsider the disadvantages of the physical classroom setting. One of the educators approached efficiency as the flexibility that the online setting provides to educators to choose the environment they want to work from. In addition to this, the above respondent highlights the reduced environmental impacts because of the switch to an online setting and the aspect of resource-efficiency. While most of the DRR community works in the field [41], engagement outside the classroom can be a challenge and concerns should be raised about access to flexible learning while safeguarding the inclusive nature of learning opportunities. According to Noh et al. [29], most part of disaster education is implemented as apprenticeship schemes and work-based learning modes and they act as key elements of a functional technical and vocational system. The disruption brought in by the COVID-19 outbreak to technical and vocational education and training systems and workplaces, affected apprenticeship schemes and work-based learning modes significantly [43]. In this context, the efforts made by educators seem commendable.

Furthermore, the majority of the interviewees acknowledged the advantages offered by synchronous and asynchronous learning alone yet stated that it is the combination of them both (i.e., the FCRs) that works best within the DRR education setting. Mostly their teaching is delivered (mainly) through lectures in combination with classroom activities (including case studies, evidence-based learning, etc.) and whether the session is delivered online or on-site depends on the nature of what is being taught. For instance, some UK experts highlighted that sometimes online lectures could be much more effortless if it is the only theory being taught compared to students coming all the way to the University just for that lecture. The decision of the delivery method is usually preplanned. However, the majority preferred meeting their student coherently in person as they believed there was a better understanding which could help them adapt the content or tailor material on the spot.

Summarising a popular view, an educator made an interesting distinction between aspects of DRR and related fields that can and cannot be successfully taught online. According to the interviewee, competence is comprised of experience, knowledge, attitude, and skills. In the interviewee's view, knowledge is the only aspect that can be fully taught online. Thus, competence cannot be fully achieved in an online setting and if efficiency is defined as the process of creation of competent practitioners, then the effectiveness of the online setting for DRR and related subjects is significantly reduced. The above respondent explicitly indicated in relation to the above, that "Students cannot become good disaster response managers through only online teaching without interaction and the social factor". Presenting a less optimistic viewpoint, another respondent mentioned that online learning is a good backup but should not be the main form of teaching.

While the aforementioned aspects reflect on the effectiveness of online and distance learning education for DRR and related subjects in general, the next section describes the key attributes that help demonstrate the prevailing situation of online and distance DRR education.

4.2. The status quo of online and distant DRR education

The below-described themes are extracted from the expert interviews and include both positive as well as negative aspects highlighted in providing views regarding the status quo of online and distant DRR education.

4.2.1. Digital divide: The main hindrance to assuring equal access to online education

Inequality in student access to digital learning resources, technology, or devices while at home, was described through several 3 key means including, poverty and unaffordability, students living in disaster-prone areas, and ICT infrastructure-related issues. This was the case in certain developed countries as well. For instance, LUND, Sweden's results have also identified the digital divide as a cause that excludes certain individuals such as those who do not feel comfortable in an online setting and those who do not have a steady internet connection (e.g., outside capital or major cities). An expert explained how poor, interrupted, and slow internet connection and network downtime affected the online activities. This resulted in students' failure to fully attend the anticipated learning experience. The expert who teaches students located in different parts of the world added "If your Internet is slow, that is the end and then you cannot catch up. If your mobile phone doesn't work, you cannot participate in an in-class vote. And again, you are missing out on the activity". Another expert highlighted the challenges students from different geographic contexts face, especially those who live in vulnerable communities or disaster-prone areas. She related one of her experiences "I'm not even talking about global south here. Last week we had a session and one of the participants was in Florida. And she had to evacuate because of the hurricane. She didn't have the Internet like in the middle of Florida, right where normally she would have a connection and that was it. So, she tried to call in from her mobile phone. But you can imagine that the experience is not the same, right." Describing the effects of poverty, unaffordability and underdevelopment, a UK educator stated " unfortunately if they don't have a good connection they can't follow. So they always have to rely on recordings and sometimes you know, students complain that even to download one hour or two-hour recording, they have to spend a lot. This widens the gap between rich and poor students". He further mentioned that all the data technical issues and monthly rental (internet and data costs) which simply are inherent to underdeveloped countries contribute to all adversities related to online education in general. In fact, it has been revealed in a post-COVID impact research study conducted in a developing country that students from low-income families have suffered and were anxious about the data cost [20,46]. Further, the cost involved with accessing content has been a burden to the student in online learning [35]. This scenario contributes towards the digital divide that could be defined as the deprivation that people suffer without access to information which results in information gaps ultimately leading to the dehumanization of citizens' rights [2,47]. In this given context, the right to education of the learners is at stake.

4.2.2. Online vs on-site DRR teaching

Discussing the above key pedagogical approaches lead to a discourse on the suitability of online approaches compared to on-site teaching. This was brought in, particularly when discussing blended learning. Online live lectures became an issue with the tutors starting to feel an absence of the connection they usually build with the students during on-site lectures. This became worse at that time when the students preferred to switch off their cameras. As a result, the majority of the educators experienced awkward and non-interactive sessions. As much as interactions are important for a subject like DRR, it was the live lectures and asynchronous sessions (with one-way responses for interactive activities) that was the next best option following the emergency shift of education due to the COVID-19 outbreak. Out of the above methods, although synchronous learning appears to be interactive, there can be disruptions due to signal failures, and platform-related issues like screen sharing not working, etc. This contradicts the findings of Dwivedi et al. [11] where it claims that the shared screens of teachers to provide a live walkthrough demonstration enabled the students to follow on their devices and when students shared their screens to respond to problems the students encountered. In this context even though it has been said that synchronous learning gives a good experience in terms of interaction [16], the interviewees considered it otherwise in the given online teaching context. This has resulted in educators going for on-site lectures whenever possible. By that means, blended learning was a popular option as it helped the tutors benefit from a unique online element in the teaching. In this context lack of interaction is considered as a disadvantage in both synchronous and asynchronous learning even though

Littlefield's [24] has claimed that these learning styles have their own advantages and disadvantages.

4.2.3. Interactive learning

Many interviewees in different contexts agreed on the vitality of applying interactive means together with live lectures (synchronous learning) to ensure the active engagement of students. Interactive materials and activities are recognized as resources for digital accessibility and inclusion in learning [21]. One example from the VGTU, Lithuania is that all their interviewees use different applications in order to attract students and involve them in lectures (Mind Mapping tools, Kahoot, HP5 tool in MOODLE for different purposes, etc.). Interactive learning not only helps educators to understand the student coherently but also to share knowledge and experience as experiential learning is a powerful foundation for DRR, especially in the presence of students from all over the world. Interactions are not all about seeing each other or students reluctantly switching on cameras for online live sessions.

As per a Japanese educators the reluctance of the students to turn their video on needs to be considered as their freedom of choice; and, instead, active interactions can be suggested and encouraged by typing their comments and feedback. Below are some advantages of encouraging an interactive environment in online DRR sessions;

1) Helping working professionals enhance the scope of their employment opportunities
2) Enabling to listen to some first-hand case studies from the affected areas
3) Giving an equally accessible platform to specially-abled students
4) Ensuring a variety of viewpoints other than 'predominant' discourses
5) Enabling rural people to continue their education
6) Enabling women who are not encouraged to leave home for further studies to join professional online courses

4.2.4. The mixed approach in combination with self-directed online learning

Mostly preferred by educators and considered the most effective for DRR education. Most of the interviewees agreed that diversification of learning methods aids in providing a more equal setting for students with different backgrounds and skills to learn effectively while addressing the digital divide. This can be argued as a form of blended learning with a mix of different types of learning strategies that allow tutors to reap the benefits of both online (asynchronous and synchronous) and on-site online learning strategies. For instance, some educators pointed out that tutors have the possibility to prepare beforehand what will follow in the physical setting especially through an asynchronous format before the face-to-face classroom. One of the above educators argued that it goes beyond pedagogics and it is mostly a way of conserving resources in a resource-scarce environment.

Particularly the combination of the 2 methods face-to-face lectures and self-directed learning was highlighted by many UK experts. This is mainly because of the connection (with face-to-face meetings) an experienced educator builds up with his/her student cohort through real-time observations and interactions which helps him/her evaluate the weight of knowledge to be delivered spontaneously. Some of the experts further explained the importance of adapting the teaching content based on the understanding, experience, and behaviour of the students in their audiences.

The vitality of interactive sessions in learning DRR largely helps not only to understand the student cohort but also to share knowledge and experience as experiential learning is a powerful foundation for DRR, especially in the presence of students from all over the world. According to a UK expert, the DRR learner should not be just a passive recipient of knowledge, she added "we cannot teach Disaster Risk Reduction with a banking style of education, where the teachers know everything and then the student is just as a passive recipient of the knowledge…I rely on Paulo Freire's sort of pedagogy of the oppressed in the understanding of injustice and vulnerability and this is where interactive learning works best because we can immediately see kind of the emotional response". However, several experts have observed that students are reluctant to switch on cameras. This prevents the tutors from understanding the student cohort and tailoring the content. It has not been a pleasant experience for many tutors, one of them mentioned: "There was no emotional connection that I rely on quite a lot. So, I found online as a kind of very non-engaging, non-interactive experience".

Presenting his views not in favour of online teaching for DRR, an educator brought an example of one of the aspects of DRR, which is emergency response courses/modules. He added "You are teaching people to save or to ignore. In other words, to kill. So, you don't want them to miss it, so you want them to be careful of what they are learning and how they're applying it. It is similar to the difficulty of teaching critical care in healthcare subjects via online sessions." Therefore, it can be argued that interactive and engaging in-person sessions are more suitable for DRR education followed by self-learning, debates, and discussions. However, it is equally important to find the right balance of self-learning and didactic learning, given the sensitivity of DRR subjects. For instance, one expert was hesitant to comment on the effectiveness of FCRs and blended learning that involved self-directed learning specifying "I'm not sure if we've found the right balance of how much I actually want them to watch ahead of time, but then in the same breath, they're very used to watching and listening to lectures online and so coming into class, I think it's harder for them to take notes and things like that. So how effective are they? I can't answer that yet because we haven't gotten back into a rhythm. I don't think students have gotten back into a rhythm". Thus, the methodical planning of DRR modules should include striking the right balance between self-directed learning and didactics (lecturer-centred knowledge transferring) while promoting interactions and active student engagement. The effectiveness of such methodically planned DRR education would advise on harvesting the benefits offered through online learning. Online education is known to improve the skills and outcomes of self-directed, autonomous and motivated students with good digital literacy and time management skills [30]. Striking this balance will in fact not leave the other types of students who in fact require further skills and motivation to be engaged in online learning. These efforts reiterate with the following resources recognized by the Jeffery et al. [21] to focus more on digital accessibility and inclusion in learning.

4.2.5. Communication differences

When the conventional class setting changed with the shift to an online setting, classroom communication too changed. There have been clear observations regarding classroom communication given the variety of students in the usual DRR classrooms. One of the key observations by the educators was that some ideas/ students asserted dominance during open-flow discussions. An expert highlighted the improved expressiveness of experienced students compared to full-time undergraduates in her classes. While this dominance can be argued as a positive trait it can sometimes threaten the balance of the flow of ideas and equal participation of students. Especially when there are evident differences in the student mix, for instance naturally shy students from different cultural backgrounds. While the majority talked about the confidence of students to speak in the class, the above respondent highlighted performative or creative confidence "I think that kind of action itself requires a sort of performative or creative confidence. The confidence to inhabit or pretend to inhabit the shoes of others or other places. There are particular kinds of people who are more willing to do that or feel more comfortable doing that. And on the flip side of that, there are people with particular sorts of needs who may not be able to kind of express themselves. In those ways, in those sorts of situations, I think definitely there's a creative and performative confidence that has to come with learning in that way".

4.2.6. Educator's role to ensure equal participation

In general, interviewees were of the view that equal participation appertains to the educators' approach. They asserted that it is the educators' responsibility to ensure equal participation and the onus is on them to improve the students' engagement in different online teaching strategies. Stating a supporting view an expert mentioned "I think the onus is on me to make sure that I've structured the questions that I ask them in such a way that I show them that we're getting the most out of them as opposed to putting the onus on them to answer the questions." And she further added "This is all about relationship building and so I try to encourage this group in this way. It's an encouragement for everyone to have something important to say and promote that in such a positive way and an openness on my part as well. Telling them when I screw up and I think that that gives them the opportunity to feel that it's OK if they share their opinion or they share their position or argument." One aspect of educators being responsible towards ensuring equal participation is understanding the difficulties the students face. For instance, an expert highlighted a question that educators should answer before designing an activity/ assignment/ homework "whether they have the kind of support, capability and confidence to do what you ask students to do in their own time?"

The interviewees who agreed that they are responsible for promoting equal participation of students mentioned some of their good practice. According to an expert, "You get students with visual impairments, non-native speakers. There are so many things that we have to be careful of, even font size and font colour, use of complex languages...". A young UK educator who strongly believe that educator has a lot to contribute to promoting equality and inclusivity in students' participation explained one of her strategies "I start off all classes telling them that no matter what anybody says, I'm going to tell them that they're wrong. It doesn't matter what you say. I could agree with you 1000%. I could have the exact same position, but I'm going to tell you you're wrong and this is my tool to make sure that you can respond to criticism. So, it's promoting critical analysis. So, I explain it to them as a pedagogical tool and then they know ahead of time that they're going to be told they're wrong no matter what. So, it's OK if they actually get it wrong because no one's going to know that they actually got it wrong."

An educator who supported the power of anonymity as a mechanism to give every student a voice further stated, "with the online, no one has to turn their camera on but me". According to her "Some students are self-conscious of their living environment. Some students are doing their work from random places, and so the equal participation is, well, no one's going to be judged and no one has to be worried about having all of that recorded as far as different perspectives."

An educator representing a degree programme that offers teaching bilingually in a multilingual country raised attention to the difficulties for monolingual students (students who do not speak/understand the languages the programme is being taught). He further stated the difficulty to find material in different languages "language barrier was there because we conduct lectures bilingually and if we upload a documentary in English, it is very difficult for us to find its Sinhala or Tamil (majority of the students enrolled in the programme speak/ understand these 2 languages) versions or Sinhala or Tamil documentaries in general". However, it can be argued that this incident largely presents the cultural impacts on education and therefore cannot be generalised (almost impossible to the UK scenario). Yet this brings attention to the idea that culture gaps are prominent and they may misinterpret student behaviour in classes as well. Although educators work hard to understand their students from different cultural backgrounds, these situations could take place possibly until the educator-learner relationship matures.

Typically, some DRR courses/ programmes/ modules are known to be a niche in higher education, particularly in some countries. Therefore, there are only a few experts capable of teaching those areas and understandably this could give rise to problems related to copyrights (for lecture material or recorded lecturers). Without a sufficient understanding of copyrights, some of the lecturers refused to allow their lectures to be recorded; in a context where the recordings were the only choice for the majority of students who had internet-related issues. An expert described this experience as a head of the department "some lecturers did not want to share other recordings because what they said was, what would happen if student uploaded their recording illegally in other channels or YouTube and who is going to take that responsibility? So, in that context, what happened was some lecturers said they will conduct the live lecture, but they will not share the recording and we were not in a position to force the lecturers to record". This draws the attention to educating the lecturers on aspects like copyrights on material as well as exercising professional due diligence.

4.3. Unique benefits of online education for DRR

Besides several ongoing studies that reviewed the benefits of online education in general, the benefits of online education particularly to the DRR discipline are under-researched. Below are some of the unique benefits of online education for learning and teaching DRR.

4.3.1. Knowledge sharing among learners from different contexts and expanding exposure to experts

Online and distance DRR is especially effective for learners from all parts of the world including learners from exposed or vulnerable communities. As per a UK expert "I think it's very effective to have this online and distance learning because let's say if we have designed a course from the UK and students from Indonesia, Thailand and Sri Lanka, also can engage with this DRR course". In fact, another UK expert highlighted bringing awareness through DRR education as an indicator to measure the effectiveness of online and distance DRR education ". This also works both ways; not only do the students with disaster experience learn but they also share their experience. Another UK educator commented "The programmes that I teach here based in the UK, they tend to be UK-based students, many of whom who never left the country before. The idea of studying, studying just DRR and their minds at the beginning of the kind, of course, is about learning about faraway places and contexts and people. And that's their kind of main driver or main interest and I think". Therefore, it can be argued that online and distance education is very effective to connect students, teachers, ideas, and experiences internationally, however, should be offered to the right group of students who prefer to learn DRR through online means.

Experts further argued the importance of learning from one another in the DRR education environment stating "We can learn from each other. And given how international the classrooms are I find it most useful to learn from the students. I'd ask how does it work in your context? This is what disasters are about. There is no universal definition of disasters". With online education, resources are no longer limited to geographical contexts. As a result, knowledge sharing has been elevated by universities facilitating guest lectures from experts around the world.

4.3.2. An embedded experience

Online education allows students to better imagine and have an embedded experience of what they learn through DRR. An expert explained this stating "It enables them to get familiar with and embed themselves in other contexts in ways which, if they were just sitting in the lecture or sitting in a group tutorial, they would never be able to kind of imagine embedding themselves with them. So, in some ways setting up material, showing them and having resources online where they can look at videos, can listen to podcasts. They can see all sorts of different mapping kinds of technologies and those sorts of things. It's another way of embedding them and familiarizing themselves with contacts that they've had no direct experience and, in their lives". Given that computer software simulations or computer software demonstrations are a critical aspect of DRR education, e-learning offers benefits and is an ideal mode. Presenting that idea an educator stated "effectiveness might be higher if they are doing some sort of, let's say, computer software simulations or computer software demonstrations or something".

Most importantly visualisations of complex data to easily understandable means help educators to better approach the students. For instance, this could be of larger importance when presenting statistics and consensus-related disaster events and trends, outliers, and patterns in data can be efficiently communicated.

4.3.3. Flexibility

DRR student cohorts are diverse and that includes time-constrained working students. Learning at students' own pace is beneficial for working students and it allows them to attend essential out-of-class activities/ engagements. The interview findings indicate that sometimes the resources in terms of DRR education in all forms are minimal in disaster-prone and disaster-affected contexts. Therefore, boundaryless online education is beneficial for students from disaster-prone/disaster-affected contexts, especially in less privileged settings. Especially with the prevailing economic crisis situations, it largely helps the students to save their (commuting) time and cost.

4.3.4. Identifying effective pedagogical approaches for different student cohorts

According to the experts, the effectiveness of online and distance DRR education depends on the learner group. Online and distance DRR education is highly effective for groups of students who have developed a passion for the subject or opted for DRR out of different alternatives. This is an alternative to the students who get selected/eligible to learn from their earlier performances or scores, or in other words who have not had many options but to select the DRR subject area/programme/ course. A UK based educator described this group as "The actual people who would want to learn DRR". Another educator described this group as mature students and shared that mature students are more likely to complete the work supplementary to other activities, so online learning is more important. In most cases, this group consists of working students or experienced students (professionals). To compare and contrast, the other group which is the undergraduates with less experience, perform best in the presence of an educator. Therefore, for them online and distance DRR may not be the most effective solution. An expert argued, "If the student group is not very much experienced and if they need more engagement with the tutor or the lecturer effectiveness could be limited with online and distance learning". Not only do the higher levels of confidence, enthusiasm, maturity, and independence as a learner make the experienced and working students group better recipients of online and distance DRR but also some other reasons. These include the flexibility associated with online learning as the group may have other commitments and engagements and the ability to work while learning. For instance, a UK based expert mentioned "people who are working in the industry can't get the leave for six months and come all the way to learn this course. So, in that sense, distance learning and online learning are very effective. While they are working, they can engage with the DRR subject areas and learn them. So, it's very effective I guess." However, it should also be noted that there are students among undergraduates who find online and distance education effective especially due to the anonymity and flexibility.

Based on the findings students can be classified based on their natures and approaches were undertaken in learning mainly as motivated students, experienced students, graduates, undergraduates, and students with difficulties.

- **Motivated students**

This implies that students are willing to do self-directed learning, and extra supporting learning activities in addition to what is taught to them. They are more responsive and engaging and tend to thrive in challenging times (for instance; continue to learn with difficulties for online education). Therefore, asynchronous learning, FCRs and MOOCs, specifically when there is a self-directed learning element, work well for those students. For instance, an educator mentioned "they have like a purpose and that's why they invested their time in asynchronous learning. So, I think that it can be very effective if the students are willing to invest."

- **Experienced students**

A key feature of this student category is they are resourceful, and their experience can elevate discussions in the classes while helping other students to learn from them. At times their purpose is to obtain a qualification for career progression or learn a new expertise/ special subject area. For this category of students (including the above categories motivated students) the most suggested pedagogical approach was MOOCs. For instance, according to a respondent "when they already have their PhDs, and they are industry, and they are experts in their field, and they want to get the learning knowledge on a particular subject area. In that sense I think MOOCs are a very good platform". Moreover, as per an educator asynchronous learning is also effective "for those that have a grasp of the basic principle. So maybe for continuing professional development or people who are working in the disaster area. I think that's good for challenging existing ways of thinking and maybe moving the discussions forward."

- **Undergraduates**

Graduates are the lowest level in the hierarchy of learners in higher education and a student coherently represents engaging motivated students as well as shy, distracted, and disengaged students who often need guidance from educators. According to the experts, it is the guidance that undergraduates primarily expect from the lecturers. Therefore, more suitable approaches would be synchronous and blended learning. Particularly in online sessions, the experts noticed that students' tendency to communicate using the chat feature. An educator explained this tendency stating "students might be more inclined to put a comment in chat than they would actually say face to face, and it will get past some language issues. happy to write but maybe feel inhibited talking in a language which isn't their first so there are advantages". It can be argued that anonymity in an online learning environment encourages students' engagement.

- **Graduates**

This included mature students with an assumed understanding compared to undergraduates. Usually, they opt to further study willingly to invest their resources perhaps to gain the necessary skills for the competitive world of work, or to develop a sense of self-worth implying that all the above approaches are suitable.

- **Students with difficulties**

Difficulties can be of various forms that decide on the students' full and effective engagement and receiving a similar education on the same footing as others. One of the prominent difficulties is the internet connectivity, especially for those who are not living in urban areas. This problem was location specific and was common for students from rural areas. For such student groups accessing the online platforms itself was a challenge with their limited means of resources to afford laptops that are good enough to attend online classes. Affordable internet plans for the students became crucial for many of them to be able to utilize the online mode of sessions effectively. Two of the interviewees in the sample deliver lectures in a developing country (Sri Lanka). Their teaching experience was significantly different to the experts who conduct lectures only in the UK. One of them explained his everyday experience "most of our students don't have computers or proper Internet facilities. So, under that context, it's very difficult for us to mainly go for online education. We might have already excluded some students". Adding to that, the other educator highlighted the bandwidth issues and signal issues causing both tutor and students to switch off video mode during

lectures. These challenges have not been discussed in the UK context. In such circumstances the effectiveness of online education is questionable. However, in some other parts of the world, the flexibility offered by online education and the opportunity to learn at a comfortable pace makes online education desirable for students with learning difficulties, external commitments, mobility issues, etc. For instance, a UK based educator stated, "can study whenever and wherever they want" while another UK based educator exemplified a situation where students can revisit recorded lectures as "tutor may be a little bit faster and for some students may find it a little bit difficult".

To summarise the majority view, the interview findings from Sweden LU highlighted the difficulty to receive feedback from the students as a precondition to becoming aware of the challenges they are facing during different learning settings.

4.3.5. Inclusive discourses in sessions and classrooms

As discussed in detail in the previous sections, DRR educators affirm the relevance and importance of within-class discussions in learning DRR-related subjects. However, the majority bear the opinion that the equal participation of students in discussions is not at a satisfactory level. This is because of the resistance of some students to speak up during the discussions for several reasons including natural shyness, feeling inhibited, language issues, or simply because they think it is disturbing the others. However, at least within the contexts the interviewees represented, the majority of the educators believe in post-structuralism in education and promote inclusive discourses in their sessions and classrooms. The majority of views include support for giving voice to all the students in the class equally during discussions/ presentations (including the extroverts, introverts, experienced, inexperienced, outgoing, and inhibited students in the class). If there are students who appreciate anonymity and if they imply it allows them to better engage, the interviewees looked for ways to understand the cohort through anonymous responses. Experts in unison agreed that anonymity has increased responses and hence they promoted responding through chatting (texting) other than talking when appropriate. However, it is vital to emphasize that this anonymity has also resulted in a higher rate of cheating and plagiarism leading to questioning the students' academic integrity [13].

5. Conclusion

The COVID-19 pandemic compelled both the DRR educators and the students to remain at home while seeking for accessing their educational platforms at their respective institutions. Although continuing education in crisis situations was tried and tested before the COVID-19 pandemic outbreak, it was limited to a few contexts. Hence the emergency shift of education was not smooth for everyone. Although the educators did not have the flexibility to determine the delivery mode other than following the instructions mandated by the Government/ Universities, the majority of the educators were sufficiently flexible to adapt and change their delivery style as and when needed. Not only have they learned to use Learning Management Systems, and different online pedagogical approaches/methods, but they have also employed different strategies or tools to encourage an organic and interactive environment in online sessions. With that, the students who once were confused and had a negative impression towards the new normal started to respond and perform better. Most importantly the educators were keen on creating an inclusive space within their online teaching setting and have taken challenging steps towards that. Consequently, the student groups once excluded due to different limitations could continue their DRR education. However, there are still exceptions and there are certain cases where due consideration for inclusive DRR education is lacking.

Although the post-COVID education gave rise to several discourses related to online education, the studies and discussions were not extended to the DRR education discipline. In light of the unique features of DRR education and its vitality, this study aimed to address the research gap by exploring the current status of online and distance DRR education, its effectiveness, and its unique benefits.

A few key unique benefits of online DRR education include connectivity and interactions, knowledge sharing among learners from different contexts and expanding exposure to experts, presenting different forms of data visualisations/ presentation, flexibility for working students with competing priorities (ex: financial and family commitments), equal resource distribution (the same teaching becomes available to everyone across the world), time and cost-effective (less commuting) option for learners from impoverished communities, improved engagement with anonymity, and responding through chatting/ texting instead of talking. Although these benefits suggest the efficacy of online education in the DRR discipline, the experts raised concerns over a few challenges of online DRR education in the current setting.

The findings suggest that online learning is a convenient approach to disseminating information, but it could be less effective for certain types of student groups and certain areas in the DRR subjects/ curriculum. For instance, the students with limited means of resources to afford online education (devices, internet, fees-if involved, etc.) tend to feel challenged in general. Approaches like asynchronous learning, FCRs and MOOCs, specifically where there is a self-directed learning element is not suitable for a student with learning disabilities, shy, distracted, and disengaged students who often need guidance from educators. It has been difficult to deliver the same experience through online sessions in teaching DRR subjects that involve field visits and equipment use. Therefore, the findings imply recommendations to ensure interactive and inclusive learning aimed at different student cohorts and appropriate and strategic designing of the online setting for different areas taught in DRR. DRR learners should not be just passive recipients of knowledge and hence the online settings need to be reimagined in terms of the effects of class dynamics on learning. Therefore, 2 key study recommendations of this study include having the right mix of delivery modes (online and onsite) and pedagogical approaches, and diversification of learning methods aids in providing a more equal setting for students with different backgrounds and skills, to achieve the effectiveness of online DRR education. This includes customising the delivery to suit the student group (for example, flexibility for working students, alternative delivery modes for neurodiverse students, respecting anonymous responses from students who are overwhelmed by face-to-face screen interactions, etc.). Further, the study recommendations can be identified through the responsibility of facilitator/institute and governance which should ensure the structure and continuity of basic infrastructure and further technology developments. For instance, the students who are unable to visit the field can still have an immersive experience if advanced technologies like virtual reality facilities are available to them.

The findings help educators to reimagine their delivery and design towards a more inclusive approach. Educators can evaluate the skills and competence that are essential to be digitally competent and create inclusivity within the online teaching environment. The education institutes, facilitators and policymakers could make informed decisions ensuring access to technology and resources, particularly for disadvantaged excluded learner communities. As a way forward, this study opens up directions for further research on exploring the views of students on the same aspects studied and extending this research to investigate the barriers and limitations of online DRR education for both educators and students. These future studies are significant as the views of all the parties involved help create a holistic understanding of needs and gaps which need to be addressed and improved. The existing barriers and limitations need to be acknowledged and the responsible parties should actively find solutions so that ultimately all the learners receive education on the same footing and the educators do not struggle. In the long run, effective online education ensures the continuity of DRR education nevertheless emergencies and crises. Further studies can also be extended to different other disciplines and in-depth studies on different

elements of inclusivity such as gender equality. This study can be updated with other novel online teaching delivery methods/ approaches.

While this study is limited to the scope of tertiary DRR education, the study can be broadened to include primary and secondary education in other disciplines. This study aimed a comprehensive assessment to capture the holistic view, compared to isolated evaluations. The views have covered the educators'; however, further studies should be carried out to review the perspective of other stakeholders. Further studies can also be carried out to explore how advancement of techniques could contribute to the teaching as well as assessment processes. These scope and methodology limitations helped an in-depth search within the narrowed-down scope. The educator's direct intermediary relationship with the education institutions (and hence policymakers), and the learners justifies the need for an in-depth exploration of educators' perspectives.

Finally, promoting diversity and inclusion in digital disaster education is not an overnight process nor a responsibility of one party. The generic solutions in certain other disciplines do not work well with disaster education. Therefore, it is important to understand what online setting works best for different student groups and modules. Given that the future of education is virtual and it is vital to continue DRR education in the online environment, educators together with institutes should take every effort to not exclude any student.

CRediT authorship contribution statement

Conceptualization, A.S, A.C·S, C.M, D.A and R.H.; methodology, A.S, A.C·S, C.M, D.A., R.H., C.L., M.H.., A.K. and R.S.; validation, C.M, D.A., R.H., C.L., M.H.., A.K. and R.S.; formal analysis A.S; investigation, A.S and A.C·S; resources, C.M, D.A., R.H., C.L., M.H.., A.K. and R.S.; data curation, A.S; writing—original draft preparation, A.S; writing—review and editing, C.M; visualization, A.S; supervision, D.A and R.H.; project administration, A.S, A.C·S, C.M and D.A; funding acquisition, C.M, D.A and R.H.. All authors have read and agreed to the published version of the manuscript.

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Data availability

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Appendix A. Appendices

Table 1
Interviewee information.

No	Interviewee ID	Current job title/role	Years of experience
1	E_UK_HUD_1	Senior tutor	7 years
2	E_UK_HUD_2	Associate Professor/ Senior lecturer	15 years+
3	E_UK_HUD_3	Professor	24 years
4	E_UK_HUD_4	Senior lecturer	12 years
5	E_UK_HUD_5	Professor	32 years
6	E_UK_HUD_6	Professor	42 years
7	E_UK_HUD_7	Senior lecturer	12 years
8	E_UK_HUD_8	Senior lecturer	9 years
9	E_UK_HUD_9	Lecturer	4 years+
10	E_UK_HUD_10	Reader and Director of Equity, Diversity, and Inclusion	15 years
11	E_UK_HUD_11	Senior lecturer	15 years
12	E_UK_UCLAN_1	Deputy head	17 years
13	E_UK_UCLAN_2	Senior lecturer	7 years
14	E_UK_UCLAN_3	Professor	20+ years
15	E_UK_UCLAN_4	Senior lecturer	9 years
16	E_UK_UCLAN_5	Lecturer	14 years
17	E_UK_UCLAN_6	Senior lecturer	22 years
18	E_UK_UCLAN_7	Senior lecturer	29 years
19	E_UK_UCLAN_8	Senior lecturer	19 years
20	E_J_KEIO_1	Associate Professor	10 years
21	E_J_KEIO_2	Associate Professor	15 years
22	E_J_KEIO_3	Associate Professor	8 years
23	E_J_KEIO_4	Associate Professor-	20 years
24	E_J_KEIO_5	Associate Professor	16 years
25	E_J_KEIO_6	Professor	18 years
26	E_J_KEIO_7	Assistant Professor	7 years
27	E_J_KEIO_8	Professor	20 years
28	E_J_KEIO_9	Professor	17 years
29	E_J_KEIO_10	Professor	23 years
30	E_SW_LU_1	PhD student	4 years
31	E_SW_LU_2	Associate professor	9 years
32	E_SW_LU_3	Training coordinator	3 years

(*continued on next page*)

Table 1 (*continued*)

No	Interviewee ID	Current job title/role	Years of experience
33	E_SW_LU_4	Associate Professor-	20 years
34	E_SW_LU_5	Training coordinator	3 years as an educator
35	E_SW_LU_6	Capacity development and Learning Development expert	10 years
36	E_SW_LU_7	Programme officer	14 years
37	E_SW_LU_8	Associate Professor	17 years
38	E_SW_LU_9	Associate Professor	14 years
39	E_SW_LU_10	Associate Professor, Scientific advisor	15 years
40	E_SW_LU_11	PhD student	9 years
41	E_LI_VGTU_1	Professor	35 years
42	E_LI_VGTU_2	Professor	30 years
43	E_LI_VGTU_3	Professor	25 years
44	E_LI_VGTU_4	Associate professor	20 years
45	E_LI_VGTU_5	Associate Professor	23 years
46	E_LI_VGTU_6	Associate Professor	18 years
47	E_LI_VGTU_7	Associate Professor	21 years
48	E_LI_VGTU_8	Associate Professor	19 years

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